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The Stawell Oration.¹

TIME, SCIENCE AND THE INDIVIDUAL.

By DOUGLAS J. THOMAS,

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... Blessed are the dead which die in the Lord . . . they may rest from their labours; and their works do follow them.

I AM deeply conscious of the honour you have done me in asking me to deliver this, the eighteenth annual Stawell Oration. In this Jubilee year of our Commonwealth it is, perhaps, fitting that there should be some historical background to what is said.

In the year 1919 I had the honour of acting, for several months, as house physician to Richard Rawden Stawell. In that year epidemic encephalitis occurred in this State. I remember well the day when Dr. Stawell (as he was then) began, during the afternoon teaching, to expound to his class of students the clinical manifestations of this new disease. In the same ward, two or three beds away from the patient being used by him as teaching material, was a woman who had been admitted to the old Melbourne Hospital with a provisional diagnosis of post-diphtheritic paralysis. This diagnosis I felt to be wrong. I had served one year at our infectious diseases hospital at Fairfield, and was familiar with the common clinical patterns and

time relationships obtaining in this condition. As I listened to Stawell's masterly description of this new disease, epidemic encephalitis, I suddenly realized what was the correct diagnosis for the second patient. Turning to my honorary physician I said: "Excuse me, sir, I am pretty sure we have a case of epidemic encephalitis in the ward." And so it proved to be. The young house physician went up quite a little, undeservedly I fear, in the eyes of Dr. Stawell. The friendship begun, and possibly thus accelerated, during my term as house physician continued for many years. When I first began private practice, Richard Stawell not only encouraged and stimulated me, but sent a steady stream of work which helped very substantially to ease my fear of poverty and failure. For some years I served as an assistant in the out-patient clinic which had formerly been under Stawell's care, and handled hundreds of case histories written up by him. I remember his close, accurate writing, and the fidelity with which he kept these records.

A Lover of Words.

Sir Richard Stawell spoke beautifully, had a great love of the English language, and at times was almost a purist in his meticulous use of words. Here is an example:

When one listens to the human chest with a stethoscope, the sounds produced by breathing, the breath sounds, are easily recognized, and are readily divisible into two fractions, those of inspiration and of expiration. Under certain conditions the expiratory phase is audible for a longer period of time than is normal. In current jargon this is referred to as "prolongation of expiration".

Sir Richard Stawell would, when taking a new class, always carefully point out that expiration was not neces-

¹ Delivered at a meeting of the Victorian Branch of the British Medical Association on October 3, 1951.

sarily prolonged, but that a correct definition would be "prolongation of the period of audibility of expiration". With an inward shiver, he would consent to the use of the current jargon, but not until he had purged his soul by insisting upon the use of the correct—and longer—term at least once.

How time marches on! Man has always endeavoured to resolve the infinity of time into smaller finite fractions. Even the earliest primitive man was conscious of the alternation of sunrise and sunset, of daylight and of dark, and soon he employed simple devices for the measurement of time. I am informed that the invention of the first clock is ascribed to Pope Silvester II, at the close of the tenth century. Very soon clocks superseded the more primitive sun-dials, hour-glasses, burning candles and other devices which had till then been used for measuring time. Today observatories span the world. Exact solar time can be rapidly and accurately determined, and by instantaneous signals relayed from point to point, and having been set to correct time, the modern clock will continue to record quite accurately the passage of time.

Some years ago I was in Lucerne, and there in a certain famous shop I saw all manner of clocks. They were big and small, fat and thin, strikers and non-strikers. Watches of every description could be purchased: expensive and not so expensive, those which gave the day of the week and the month, those which gave correct time for the four corners of the earth at once, waterproof watches, "boy proof" watches, watches which needed winding and those which did not. Those of us who occasionally go down to the sea in ships too often forget the story of the first chronometer. Although the problem of fixing latitude had been solved well before Columbus, even as late as Queen Anne's reign no accurate method of determining longitude at sea was available. In all the intervening years the total tonnage afloat upon the seven seas had grown, and with it the annual toll of shipwreck. And so finally the Queen was petitioned by merchants and sailors in the hope that the Government of the day would foster and encourage the development of an accurate method of determining longitude which could be used by mariners. Many of you will know how, in 1728, a carpenter named John Harrison arrived in London, how he appealed to Halley, the Astronomer Royal, for financial aid, that he might begin work upon his chronometer. Financial help was given and eight years later Harrison produced his first chronometer. But it weighed over five stone. Three years later he produced his second masterpiece; this weighed only one hundredweight. The years 1740 to 1757 Harrison spent working upon his third model. At the fourth attempt, aided by his son, he completed in two years another chronometer weighing only four pounds, and that masterpiece, which clocked an error of approximately half a minute *per annum*, settled for all time the problem of determining longitude at sea. Many years before, Sir Isaac Newton had shown how a simple calculation, when the difference between Greenwich time and local time was known, could be used to determine longitude. Fascinating though the study of clocks and clockmakers may be, I am more concerned with time not as a physical entity, but as something which comes, goes, and gives to mankind the opportunity for being and doing, for doing good, and, alas, for doing evil. I am concerned not with time, but with the fruits of time. The rich harvest of well-spent time, or the barren evil of time misspent.

The Jubilee of the Commonwealth.

In this year of grace 1951 we celebrate the Jubilee of our Commonwealth. Would that I had the gifts needed to appraise justly and well the record and achievement of these fifty years, or indeed the first hundred years of our history as the State of Victoria! One may as well endeavour to count the grains of sand trickling through his fingers as he lazes in the sun upon one of our golden beaches.

Even a single word in our English language will, with the passage of time, undergo such subtle change that much patience and study are required to trace the varia-

tions of meaning that have ensued. And if this is true of single words, what then of the gradual change of a whole book? Speaking to this theme and taking as an example the Bible, Osbert Sitwell records his feelings thus:

The Authorised Version, regarded as a book—and nothing more, has by growth and mellowing, the ever altering values of its words become more impressive than when first translated, more imbued with poetry. Now it is part of the consciousness of every literate Englishman. The writers of each succeeding generation owe it a debt which they repay throughout their lives. Yet in the end is almost every book doomed to die with the language that gave it birth; whereas the fruit of the Sculptor's and Mosaicist's career can with good fortune, endure until the vault of the temple of the firmament cracks and time itself perishes in the universal and consuming fire. Under everything that a sentient man with a soul fully awakened perceives and comprehends, the word persists. The word, spoken or unspoken, frames every feeling, and like the trumpet of a herald set on a tower, sounds to announce every new discovery, every conquest of fresh territory and every new thought, wrenched or reclaimed from the universal matrix—"chaos".

What is Mind?

If all this is true of words and aggregations of words, what of the human mind which conceives them, and from which all words flow—words which are, at their best, only a fragmentary expression of its function? What indeed is mind? Sherrington's book, "The Integrative Action of the Nervous System", stands upon my shelves. This great classic furthered our knowledge of the physical basis of mind, and of the physiology whereby it is governed. It remains today a monumental record of a mind analysing the problems of thought and nervous action. We know a great deal concerning the ten thousand million (more or less) nerve cells which, like a colossal semi-automatic telephone exchange, are linked by innumerable fibres to all parts and organs of the body, of the amazing flow of impulses and nutritional materials which share in its working, and which cannot be interrupted for more than a second or two without cessation of the whole mechanism. Many ingenious electrical devices have been invented which record and analyse the tiny impulses and rhythms which are an essential part of the working of the brain. The ordinary man in the street is aware of the end results of perception of the sights and sounds and smells in which he lives, even though he is blissfully ignorant of the delicately poised mechanism which makes these possible. In our daily social relationships, we speak and we listen to others, and for this purpose we use words. I have already referred briefly to the gradual mutation in the meaning of words, in the construction of words over (say) a hundred years. The foundation of all language is the word, a symbol of a concrete thing or the abstract idea which it designates. But what shall we say of those people who deliberately distort words, who disseminate falsehood, that they may be able to spread their evil ideologies by mass indoctrination especially of the young? We are brought sharply face to face with the error of the assumption that the living conscious body is the province of mind, and the outside world the province of matter. Mind and matter are inseparable. Perhaps we should accept the advice of Gilbert Ryle and drop both these words "mind" and "matter". To him both are "echoes from the hustings of philosophy, and prejudice the solutions of all problems posed in terms of them".

I remember well the ancient prayer in which we asked that there should be given to us "health in mind, in body, and in estate". In that prayer we can all join. From the sum total of these mental processes there flows and has flowed the progress of mankind.

As we now pass on, to consider in more material form the history of the last fifty years, let us pause for one brief moment to marvel at the beauty and perfection of human mind and body, when healthy. "*Mens sana in corpore sano*" might well be the biological goal of us all.

The March of Knowledge.

How can the speaker hope, in one brief hour, to present even the smallest review of the march of knowledge in the last fifty years? Even though we cannot run among the trees and examine the blades of grass, possibly we may stand on some lofty peak and review the prominences and indentations of our local landscape. Curiously enough, it is only since the opening of the twentieth century that we have seen the change of medical treatment from almost pure empiricism to planned and scientific therapeutics as we understand them today. I do not suggest that empirical remedies used in and before the nineteenth century have all been discarded. Cinchona bark was chewed and stewed long before the turn of the century. But white crystalline quinine bishydrochloride, injectable with safety into the human blood-stream when malarial coma threatens, is a product of the modern organic chemist.

War and Disease.

As a very small boy I stood upon a Bourke Street veranda and watched the Australian Contingent depart for the war in South Africa. Alas, far more of these men were to die from typhoid and dysentery than to be killed by the physical violence of war. Typhoid vaccine, produced by Wright in 1900, was almost universally employed in World War I. Nevertheless, I remember how at Anzac, at the end of 1915, almost a battalion of men per day passed through my unit on their way to the beach head—men whose fighting value had temporarily gone, not because of shot and shell, but because they were afflicted with dysentery, jaundice, malaria and typhoid. World War II could not have been fought and won but for the magnificent preventive medicine available to, and the devoted service given by, the army medical corps. And in our own Royal Australian Army Medical Corps history-making work upon malaria done by Hamilton Fairley and his associates helped to change the course of the war. If the stupidity of man should lead us to a third world war, even scrub typhus will no longer claim any substantial number of victims, thanks to newer antibiotics produced since World War II ended.

We have seen in recent years a steady decline in the incidence of infectious disease in our midst, so that today our infectious diseases hospital at Fairfield stands almost empty of such cases. Diphtheria, owing to the successful immunization of our children, has dropped to almost negligible proportions, and the hospital beds once reserved for such patients can now safely be used for other and more general purposes. But we still insist upon killing each other upon our roads and highways because of our appalling lack of caution (and, indeed, good manners) when sitting in cushioned comfort behind the steering wheel of the modern motor-car. False and sterile ideologies have gripped the world, and at almost any moment we may be blown into tiny fragments by lethal atomic weapons.

Progress of Radiology.

There are many problems confronting the scientist. Malaria still has an annual death rate of three million people. Cancer, coronary disease and all kinds of stress phenomena challenge our ability to work, plan and discover. But let us resume our recital of things achieved since the opening of the twentieth century. In January, 1896, Wilhelm Conrad Röntgen read his famous paper "Über eine neue Art von Strahlen", in which he announced to the world his discovery of what is today universally called the "X ray". Although the clinical application of this new discovery proceeded apace, twenty years were to elapse before radical changes in the design of X-ray machines and equipment made it possible to produce images exquisite in their perfection of detail in bone and certain soft tissues, even with the heaviest patients. Till then it had been almost impossible to get satisfactory records of heavy people, except in respect of accessible regions such as the limbs. For some months during 1920, whilst serving as a registrar, I was called upon to act as resident radiologist at the Melbourne Hospital. In my

ignorance and despair I frequently referred to X-ray plates (for films were not as yet in general use) as "photographs of a sand-storm in a fit". Today all this is a thing of the past.

Perhaps no single branch of medicine has gained more from the discoveries of the allied electrical sciences than cardiology. In the study of the human heart and great vessels the equipment is indispensable, for not only can we accurately determine the size and shape of the individual chambers, but we can, by using special injection techniques, outline in high degree the various blood vessels related thereto. Our surgical friends have been quick to utilize the advances made, and to tackle the problems of cardiac surgery. A great number of surgical procedures upon the human heart may now be undertaken safely. The conditions producing "blue babies", many other forms of developmental defect, and even the late effects of rheumatic heart disease are steadily yielding to the surgeon's skill.

Cardiac Surgery.

One cannot mention cardiac surgery without referring to the life and work of Helen Taussig, for she it was who, over many years, developed our knowledge of the congenital malformations of the human heart and great blood vessels. The most skilful surgeon is impotent without full knowledge of the variation of function resulting from distortion of structure. As one waggish student remarked: "You can't monkey with the plumbing unless you know where the pipes go."

These days many school boys build their own wireless sets, and it is not surprising that amplifying valves are used to assist in recording human heart sounds. The human ear is relatively insensitive to sounds exhibiting a low frequency. The third heart sound, for example, has to be ten thousand million times more intense than a heart murmur exhibiting a high frequency, if it is to be easily heard. Such a murmur may be the product of valvular disease or of congenital defect, or not infrequently it may have no clinical significance at all. The value of phonocardiography, as one form of mechanical registration of heart sounds is termed, is considerable. Let me give you an example. Under certain conditions, a pathway between two great arterial vessels, the aorta and the pulmonary artery, persists even into adult life. Normally this connexion rapidly disappears after birth. When it fails to disappear, a condition known as "patent ductus arteriosus" is present. Such a condition is frequently detected by discovering the presence of a most peculiar heart murmur. This murmur, alleged to be quite distinctive, and going by such names as "the cog-wheel murmur" and "the machinery murmur", may mislead both physician and surgeon. Indeed, operation may be undertaken, only for the discovery to be made that no patent ductus is present. A detailed examination of the graphic record of this murmur renders such a mistake less likely. How Stawell would have loved to test the accuracy of his ear against this modern aid to diagnosis! The basic mechanism underlying the contraction of the heart is a change in the electrical state of heart muscle. A wave of depolarization (whereby active muscle becomes relatively negative to inert muscle) followed by a wave of repolarization spreads throughout the heart with every muscular contraction. Minute analysis of the wave forms accompanying these changes, as recorded by the electrocardiograph, is of the greatest help to the practising physician. Here again we see how science has come to the aid of medicine. Notwithstanding all this, the physician requires skill and experience, and above all things must possess sound clinical judgment if he is to use wisely and assess the collateral knowledge furnished by these instrumental aids.

Stawell, like Osler, was a superb clinical teacher, and brought to the bedside not only learning, but rich gifts of understanding. We owe so much to the British cardiologists that it would be ungracious not to mention the names of some of them. Mackenzie, Lewis, Parkinson, Bedford, Cotton, Evans are but a few known and honoured by the Melbourne school of cardiology.

Since 1919, the year in which I served as house physician to Richard Stawell, insulin has revolutionized the treatment of diabetes, liver therapy and our increased knowledge of red blood cell maturation have largely subjugated pernicious anaemia, and an increasing number of sulphonamide drugs and antibiotics have robbed bacterial infections of much of their sting. It is with no small pride that we record the setting up in Melbourne of two research institutes, the Walter and Eliza Hall Institute of Medical Research and the Baker Medical Research Institute. We rejoice to learn of the recent John Holt benefaction, which now makes it possible for a third research foundation to be established. The work of Kellaway, Willis, Burnet and others has secured international recognition for these two institutes. Those of us who have seen the dreadful effects upon the unborn baby of rubella when occurring in the expectant mother, thrill with the knowledge that this danger has almost passed. The brilliant clinical investigations of Dr. Norman Gregg stimulated important research work into the problem of prevention. Work done here in Melbourne has produced a method of using the serum of one recently convalescent from an attack of German measles, thereby preventing the natural maturation of the disease in the mother and so protecting her child. While it cannot yet be said that the protection is total, we feel that even this measure of security is only just round the corner.

Problems of Coronary Disease.

The awful toll of coronary disease remains. This insidious malady, thickening the coronary arteries and starving the heart muscle of its vital blood supply, continues to make inroads upon our professions, at an age when men who are mature in mind should reasonably expect one or more decades of fruitful life. Recent work has given encouragement to the belief that the aging process in arteries is not merely due to the passage of time, but is related to a disorder of the chemistry of fat in our bodies.

The problem of cancer remains unsolved. Some of you will know that in this State we are busily engaged in the creation of the Peter MacCallum Clinic. This hospital and clinic will be controlled and directed by the Cancer Institute Board, of which body I am at the moment the chairman. Men are being trained, staff and equipment are being steadily assembled, and a building programme is being pursued, whereby the old Queen Victoria Hospital in Mint Place will be adapted to the needs of a really first-class cancer treatment centre. All this is possible because the Victorian Government in its wisdom passed an Act, number 5341, "An Act relating to the Establishment and Management of a Cancer Institute for the purposes of Research into and Treatment of Cancer and Allied Conditions, and for other purposes", and continues to provide the money so essential to the carrying out of a large-scale project.

Here let me pay tribute to the memory of the late Sir Albert Dunstan, for it was his energy and vision which were so largely responsible for the passage of the Act. The plight of many cancer sufferers is pitiable. Unlovely, untended, unwanted, too many of them languish and die without benefit of admission, during the closing weeks of their lives, to hospital or other institution. I record with particular pride the establishment by my board of a nursing visiting service for these people. I believe this service to be in its infancy. I must express my admiration of those women, trained members of the nursing profession, who have undertaken this task of daily visitation. Without a true sense of mission they would not be attracted to this work, nor carry on in the best Florence Nightingale tradition. Yes, the lamp still burns.

The last fifty years have seen the creation in Melbourne of a magnificent series of church hospitals, and I am happy that my life has been so largely spent in association with them. Today, Bethesda Hospital, Epworth Hospital, Saint George's Hospital, Saint Andrew's Hospital, the Mercy Hospital, Saint Ives Hospital, Mount Saint Evins Hospital and other hospitals in this city bear witness to the spirit

of community service which lives among us. Nor has the provision of such private and intermediate hospital accommodation been undertaken by church bodies only. The Freemasons' Hospital, Hamilton Russell House, Heidelberg House are likewise the result of community planning and service by their responsible governing bodies. All of these are non-profit organizations. Time will not permit the mention of all similar hospitals, but we should record appreciation of the magnificent work they are doing. It is a national tragedy that the cost of maintaining these institutions has reached such astronomical proportions. Engineers, physicists, chemists, bacteriologists and all the "handmaidens of science" have played their part in creating the technical standards which obtain in the care of patients today. In days to come, as in the past, the basic needs of man will be food, clothing and shelter, but it is increasingly clear that the future of mankind will finally rest not upon the scientist, but upon the ability of mankind to learn, understand and practise principles taught and given to him in simple language two thousand years ago.

Australia and the Pacific.

Anyone who has gone by air out of Australia by a northern exit and has landed in Singapore, Borneo, Morotai or New Guinea, will have realized just how near we are to our Asiatic neighbours. We are inclined, because we live in a vast island continent, to develop insular self-complacency. Only a small percentage of our Australian population speak any language save their native tongue. When we travel, some of us in our ignorance take rather a poor view of those who cannot speak English. It is high time we did better. I believe with Dr. Leonhard Adam that schools of Oriental studies are needed in at least two Australian universities as a first step toward better mutual understanding with our Asiatic neighbours. How can we expect to breed and train men and women capable of understanding their religion, their culture and their history, of reading their minds, unless some of us become proficient in the language of these people? Too few are familiar with the history of Australian missionary enterprise in the islands of the south seas.

Doubtless many of you will remember that, prior to the work of the Pacific missionary pioneers, the Pacific, the ocean of islands, was peopled by savage tribes which included cannibals and head hunters. Many of these men and women forfeited their lives in devotion to duty in such places as Tahiti and Tonga. Slowly, surely, however, their work went on. Only one hundred years ago Charles Darwin, whose name needs no introduction to men of science, when answering the critics of this missionary enterprise, concluded: "They forget, or will not remember, that human sacrifices and the power of an idolatrous priesthood, a system of profligacy unparalleled in any other part of the world, infanticide, a consequence of that system, bloody wars, where the conquerors spared neither women nor children, that all these have been abolished." Christianity was taken to Fiji from Tonga. King Thakambou of Fiji, at fifty years of age, boasted that he had eaten his share of a thousand human bodies. But this chieftain finally embraced the new faith and lived a life beyond reproach. It is recorded that he could in his later days be seen spelling out the Scriptures, instructed by his own child, a boy some seven years of age. I recount to you this tiny fragment from the history of a great enterprise to remind you again that we live very near to the people of southern Asia, and to encourage you in the belief that the achievements of the past can be reproduced in the future, in fresh lands and among new people. We live in a dangerous age. No man can say what the future holds. But I firmly believe that Australia is destined to play a great part in the development of cultural relationships with Asiatic peoples of different class, creed and colour from ourselves. Thanks to the work of these missionary pioneers, the Japanese did not succeed in winning the Melanesians and Polynesians to their cause. They remained our allies and our friends. Many stories could be told of their untiring devotion to our servicemen. New Guinea possesses an enormous wealth potential and must be developed justly, wisely and well.

Adventures of Goodwill.

The time is ripe for bolder and wider adventures in goodwill in the South-West Pacific. We should by every means give aid, encouragement, technical assistance and opportunity for social reciprocity to the students, sociologists and scientific workers of our less favoured neighbours living north of Australia. It is good to know that our Government recognizes this, and has already, to a limited degree, embarked upon a programme which will, we hope, strengthen goodwill between the Commonwealth and them. Time will be needed, time alone will tell what the fruits of such an adventure will be.

Nowadays we are constantly reminded of the shrinkage within the Commonwealth of the surplus of food production over and above that required for immediate needs. Indeed, we have been warned that within ten years we may have to import food to Australia. In this land where we have grown so much wheat we should remember something of the history of this foodstuff. At one time the primitive variety known as "small spelt" was the only one which grew wild in Mesopotamia. From a second and now extinct wild wheat came two well-marked races, and in due course hundreds of separate varieties. Considerable controversy still exists as to the origins of wheat, but in all probability the bread wheats were first cultivated near the Caspian Sea, the hard macaroni wheats around the Mediterranean, and a third and distinct type in Abyssinia. Man was eating wheat at least 8000 years before Christ. Recently the memory of Farrar, who did so much to develop suitable strains of Australian wheat, was honoured by the striking of a special postage stamp. Doubtless this new stamp was a joy to the philatelist, and it served to remind us of our debt to this great man.

Not by Bread Alone.

But man does not live by bread alone. The world has from time to time been ravaged by great scourges. In the fourteenth century a terrible epidemic of plague, still remembered as "the Black Death", swept the civilized world and caused the death of a quarter of the entire population. Starting from central Asia, it spread across Europe to England. Half the people of London died. Bodies were heaped in their hundreds in open trenches and covered with a little earth. The world was panic-stricken and demoralized. It would be almost impossible today for this disease to reproduce those dreadful conditions, for the march of science has given us powerful methods of control. In more recent years influenza has taken heavy toll of population. We remember 1919, the year in which I served as house physician to Stawell, as one in which influenza ran through this State, necessitating the setting up of emergency hospitals for the care of its victims. Schools and public halls were hastily equipped and staffed. Dreadful though these visitations were, they pale into insignificance when compared with the holocaust of modern war. Man rushes headlong to his own destruction, not through lack of scientific ability, but because he cannot learn to live peacefully with his neighbour.

Time, then, is the precious gift to all mankind—unchangeable, unchanging, universal. We may use it for good or ill. In this Commonwealth we may expend it in senseless striving or in endeavouring to create an order of society in which all may live in peace, in harmony and in contentment. The peasant, the doctor, the scientist, the research worker must all alike be filled with the sense of stewardship. We are indeed the custodians of time. I like to regard the merino sheep as the symbol of our national life. For this animal at its best is not the pampered pet of plenteous pastures, but thrives in a sterner, drier climate, feeding on light pastures containing a sprinkling of salt-bush—pastures capable only of carrying one sheep to every three or four acres and requiring the animal to walk miles in the day for its food. But in this sterner environment, building up bone and muscle and fleece, it prospers, until when shorn it yields the finest wool in the whole wide world. Many of you will know Strepton's picture "Land of the Golden Fleece"—lovely blue hills, rolling golden foreground, disclosing semilit in the afternoon light a flock of

merino sheep. Yes, indeed, Australia is the land of the golden fleece, but if we are to hold it, we must, like the merino, toil for our food and actively produce from this gift of time the safety of the future. The ravaging of soil, the wasting of time must cease.

Faith and Ideals.

Man on the whole does not like work. But history shows that time and again, under the stimulus of a great occasion, he has risen to majestic heights of self-sacrifice and devotion. Can we ever forget the magnificent courage of the men, women and children of England during those dreadful months of the "Battle for Britain", or their quiet, uncomplaining endurance in the years that followed? These kinsmen of ours are the continuing people—not they alone, but all free peoples. Like Drake we too can ask that when we endeavour to any great matter we should know "that it is not the beginning but the continuing of the same, until it be thoroughly finished which yieldeth the true glory". Life without faith and ideals is a sterile thing. We shall do well to remember that our future will be determined by the fruits of the spirit, not the lusts of the flesh. Let me conclude with a quotation from Sydney Walton:

"O Time!", I said, "thou proud and destroying charioteer, for ever onward rushing and staying not. One flower defies thee, and like the edelweiss in the house of the avalanche is fragrant and unhurt, for all the flint and dust of thy scurrying wheels!" "Give me the name thereof", said Time to me. First in a whisper, and then in a louder and braver tone did I make reply, and it being Christmastide in the world, the bells in all the towers near and far did awake forthwith into most jubilant emphasis. "Friendship is the word!" I whispered, and "FRIENDSHIP" is the word, I shouted full into the face of that swift charioteer.

A SURVEY OF THE INCIDENCE OF INTERDIGITAL TINEA IN A GROUP OF STUDENTS FROM THE UNIVERSITY OF QUEENSLAND.

By B. T. EMMERSON,
Medical Student, Brisbane.

WHEN the Australian National University at Canberra was being planned, the usual chair in bacteriology was incorporated in a new department of microbiology, comprising the study, not only of bacteria, but also of viruses, fungi and protozoa. The farsightedness of this step will be realized when it is considered that already a great deal of the possible knowledge of bacteriological phenomena has been acquired, while the amount known about viruses and fungi is relatively small, and this grouping of all study of minute life in one department should give opportunity for unified and valuable research.

Because of their great and demanding medical importance, investigation of virus diseases will at this stage be strongly pursued, but such may not be the case with the less important subject of mycology. This is because those fungous diseases which are common are both mild and superficial, while those that endanger life are so rare that one man in his life-time could scarcely see enough cases to make a comprehensive study of them. Knowledge of fungous diseases is scanty, and treatment is, at best, unsatisfactory. At medical schools, too, there is little systematic study of mycology, which reflects the uncertain nature of what knowledge we do possess on the subject. At the Medical School of the University of Queensland fragments are picked up in botany, pathology, and the lectures on skin diseases; but these at best can yield but a poor picture of fungous infections. No instruction on culture or differentiation of the different fungi is given.

Henrici (1940) gives a broad classification of fungous diseases, as follows: (i) the common superficial mycoses; (ii) the deep-seated, fatal mycoses. The first group is represented by states such as ringworm, athlete's and surfer's foot, and thrush—a group of mild infections which do not involve the deeper tissues, neither do they endanger life nor impair general health. The organisms are normal parasites of man and animals, and infection is due either to contagion from an external focus or to invasion by already existing fungi. This is the group, persistent, annoying and difficult to cure, which has been the subject of this investigation. Examples of the second type of deep-seated infection are blastomycosis, coccidiomycosis, sporotrichosis and histoplasmosis. The organisms live normally as saprophytes, and soils are rich in them; infection is rare and often fatal, and is similar in many respects to that caused by some of the bacteria—namely, the mycobacteria (fungus-like), such as the tubercle bacillus.

TABLE I.

Factors Influencing Infection.	Superficial Mycoses.	Deep Mycoses.
Normal habit of growth of organism.	Parasitic.	Saprophytic.
Lesions.	Mild, superficial, restricted.	Severe, deep, spreading.
Subjects affected.	Children and young adults.	Older people.
Occupations of subjects.	None in particular.	Occupation exposing tissues to soil or vegetable matter, by wounds or inhalation.
Geographic distribution of infection.	World wide.	Restricted, or if world wide, much more prevalent in certain areas.
Course of infection.	Self - limited, never fatal.	Progressive, often fatal.

Parasitism is of common occurrence in microbiology, and a successful parasite is one which, during its evolution, has established relationships with its hosts such that it may continue to exist indefinitely at the expense of the host. If the parasite extends so much that it kills the host, the parasite is worse off, as it has lost its source of livelihood, whereas if it produces too active a reaction by the host, the parasite may be destroyed. Most parasitic disease is manifested by an upset of this balance between the host's tissues and the parasite, but fungi differ in that they are almost perfect examples of successful parasitism. They go just far enough to maintain themselves and to excite the host's reactions to a minimum.

The dermatophytes, skin-living fungi, produce a great variety of superficial lesions, generally mild, which result in redness, scaliness and maceration of the skin, and sometimes in the loss of hair and the production of vesicles and eczema-like lesions. The lesion produced by certain varieties of these occurs between the toes (most commonly between the fourth and fifth toes) and is referred to by many names, such as *tinea pedis*, interdigital epidermomycosis, ringworm of the feet, athlete's foot and surfer's foot.

However, superficial fungous disease is not a purely surface phenomenon and is dependent upon factors other than local conditions. The body's resistance to infection by these parasites is as complicated as, and understood much less thoroughly than, that to infection by bacteria. It has been said that the outstanding characteristic of the fungi is their tendency to produce a hypersensitivity like an allergy of infection, and that it is to the development of this same allergic state that healing of the lesions is due. Bacterial allergy itself is but little understood, particularly in tuberculous infection, and when the affinity of this organism with the fungi is realized, as well as our minute amount of knowledge of mycology and the number of its uninvestigated processes, some idea may be obtained as to how little infections by mildly pathogenic fungi are understood.

As will be seen later, the number of investigations into the extent of interdigital tinea is large; but in all of them the disparity between clinical signs and microscopic and cultural confirmation of infection is astounding and is attributed by each investigator to something different. I believe that a large part of the difficulty lies in the fact that the fungi have been considered, and treated, as little different in habits from bacteria; if a bacterial infection occurs, the causative agent can be seen on a microscope slide and can then be grown and isolated by culture methods. To a certain extent this applies to fungi as well, but the analogy appears to have been carried too far into realms where the fungi have obviously different, and as yet undiscovered, characteristics. It would seem that a lot more study of pure mycology must be undertaken before the real reason is elucidated.

The most recent workers in this field are Marples and di Menna at the University of Otago, New Zealand. In their investigations they state that it becomes obvious that current (1948) methods of mycological diagnosis of interdigital fungous infection are far from satisfactory. In the attached summary of previous investigations (Table II) it will be seen that, when the results of all the workers are averaged, 60% of the subjects examined were suspected of being infected, but only 25% of these infections were confirmed by microscopic examination and only 5% by culture of the fungus. But to make the interpretation of this more difficult (to quote the results of Marples and di Menna themselves), almost half the positive cultural findings came from subjects in whom, by direct microscopic examination, no fungus could be found, whereas in 18 cases in which direct microscopic confirmation was obtained, no culture growth could be obtained.

This is at best a queer state of affairs—the only case at all similar in bacteriology being, again, that of the tubercle bacillus. Sputum appears free from acid-fast bacilli on direct microscopic examination, but is shown to contain tubercle bacilli on culture. Nevertheless, as in the case of tuberculosis, diagnosis may be made with considerable accuracy without the tubercle bacillus being found. However, with the present concentration techniques, the bacilli can usually be found, but no method of concentrating fungi is yet known. A random scraping is mounted in caustic potash and looked at for a couple of minutes.

Marples and di Menna even go so far as to state that "it is impossible to be sure that cases of scaling and maceration, in which findings were negative on both direct and cultural examination, were not due to fungus infection". They also state that pathogenic fungus may be demonstrated in interdigital skin which shows no clinical abnormality; this shows that pathogens can be present in the skin without clinical signs. (If this was the case, and there were no symptoms either, then surely it would be due to a contamination of the skin and could not be regarded as a true infection.)

And so, bearing in mind the dubious value of microscopic and cultural confirmation, I decided to find out if it was possible to determine, on clinical grounds alone, by a careful history, coupled, if there was any doubt, with a local examination, whether or not a person was infected with tinea. Soreness, redness, scaliness and maceration could be sought; likewise the duration of the condition, how far it had extended and regressed, how it had reacted to treatment, and what that treatment had been, as well as the very valuable, almost diagnostic, symptom of itchiness.

The aetiology being as doubtful as it is (some even hold that a concomitant bacterial infection is present), it seems unreasonable to limit cases of tinea only to those in which laboratory confirmation can be obtained. In medical practice laboratory reports are often used mainly to confirm a clinical opinion, and when they clash with this, it is the clinical opinion which usually stands and the laboratory report which is discarded.

Particularly can I quote the case of another student, already infected with *tinea pedis*, who developed itching, scaly eruptions on his leg. He was referred to a skin specialist, and they were considered to be an extension of

TABLE II.
Summary of Previous Investigations on the Incidence of Athlete's Foot.

Year.	Place of Investigation.	Investigators.	Number of Subjects Examined.	Infections Amongst Male Subjects.				Infections Amongst Female Subjects.			
				Clinically Suspect.	Microscopically Confirmed.	Pathogenic Fungus Grown.	Fungus Present.	Clinically Suspect.	Microscopically Confirmed.	Pathogenic Fungus Grown.	Fungus Present.
1925	University of Pennsylvania.	Hulsey and Jordan.	100	67%	47%	5%	47%	—	—	—	—
1929	University of California.	Legge, Bonar and Templeton.	3105	52%	90% of suspects.	5% to 6% of suspects.	90% of suspects.	15%	90% of suspects. ¹	5% to 6% of suspects.	90% of suspects.
1929	University of California.	Legge, Bonar and Templeton.	2000	78.6%	—	—	—	17.3%	—	—	—
1931	35 United States Universities.	Gould.	?	50% to 90%	—	—	—	14% to 40%	—	—	—
1933	University of Pennsylvania.	Gilman.	785	60%	—	—	—	57%	—	—	—
1936	New Orleans Penitentiary.	Howles.	?	86% to 96%	—	8% to 10%	8% to 10%	—	—	—	—
1939	"Goodyear", Sydney.	Kesteven.	?	?	?	?	38%*	—	—	—	—
1941	South Australia.	Linn and Margary.	650	71.1%	1.1%	0.6%	1.7%	—	—	—	—
1943	New Zealand.	Matthews.	2008	63%	8.9%	—	8.9%	20.7%	0%	—	0%
1944	Great Britain (Army).	Phillips.	3750	7.4%	2.89%	—	2.89%	15.8%	6%	—	6%
1945	Qualifying Military, United States of America.	Broyles <i>et alii</i> .	871	59.9%	17.7%	2.4%	18.1%	—	—	—	—
1948	University of Otago.	Marples and di Menna.	568	68.5%	15.2%	13.6%	17.8%	51.9%	2.9%	4.3%	5.4%

* Probably the false appearance of mosaic fungus caused this high figure for microscopic confirmation.

¹ Laboratory confirmation.

the tinea. Yet in them, on repeated microscopic examination, the hyphae of fungus could not be seen; but the condition cleared up on treatment with Whitfield's ointment (salicylic-benzolic acid), a specific for fungous infections. A clinical diagnosis would seem adequate in most cases to give a fairly accurate idea of incidence, and until more is known of mycology any more exact determination would be of doubtful value in interpretation.

Moreover, microscopic confirmation would have been too great a task for one student making a survey of 500 others (and less than this number could not have given a significant result), whereas, apart from its dubious value, attempted growth of the pathogenic fungus was impossible owing to the great mass of equipment required and to the skilled training in mycology which was lacking.

The first hundred male subjects were college students interviewed in their rooms. After finding out whether they thought they had tinea, I questioned them so that I could myself decide whether they really did have it, and then I looked at their feet and between their toes to see if there were any signs. Hardly at all was I unable to decide from the history whether or not they had interdigital tinea. Therefore, in those cases in which examination was inconvenient (as around the University at St. Lucia), merely by a careful talk about symptoms, signs and past history I could decide on the diagnosis.

The relation between infection and corporate life among women students was found to be as follows. Of 100 women surveyed, two were found to be infected. One of these had been infected for three years; she had attended a boarding school for two years and had lived at the Women's College for one year. The other had boarded for eight years, and during her two years at the University had lived at home. Of the 100 women, 23 had on some previous occasion been infected, but were now free of infection. All but one of these had led some form of corporate life. The survey was conducted upon 500 students (including 100 women students) at the University of Queensland in October, 1950.

Students were interviewed by the same person at all the main areas—St. Lucia, George Street, and the medical school—while dental students were questioned at the medical school. All the university colleges were examined.

From each student the following particulars were ascertained: age, number of years at the university, whether or not the subject had been infected with interdigital tinea during the last three months (winter and spring), whether any previous infection had occurred, and where, when and how it was cured; whether, while at the university, the person lived at home, at a college, or in lodgings; whether the subject had led any form of corporate life, such as attending a boarding school, what school, and for how long; and finally, military service, what service, for how long and where the subject had been during that time (that is, whether in Australia, the Pacific Islands, New Guinea, Canada, Egypt *et cetera*).

The results of this investigation are best presented in tabular form (Tables III, IV and V), the possible deductions then being quite evident. Of the 400 male students examined, 119, or roughly 30%, were considered to be infected. When they were considered in relation to military service, 324, or 81%, had had no military service (the war had ended five years previously, and their average age was 20.2 years), and of these 31% were infected. But of the 76 ex-servicemen only 22% now showed signs of infection.

When they were divided into their various age groups the maximum incidence was found to be in the twenty to twenty-two year age group (37%), after which it declined slowly. However, even in their own age groups the incidence among ex-servicemen was lower than among those who had not been in military service.

One hundred of the 500 students examined were females, 50 of whom lived at home, 43 in the two women's colleges, and seven in lodgings. A remarkable finding was that only two girls, aged nineteen and twenty years, who had both been to boarding school and who now lived one at home

TABLE III.
Relation between Infection and Place of Residence.

Type.	Total Number of Males.			Males Without Military Service.			Males With Military Service.			Female Subjects.		
	Number Examined.	Average Age. (Years.)	Positive Findings.	Number Examined.	Average Age. (Years.)	Positive Findings.	Number Examined.	Average Age. (Years.)	Positive Findings.	Number Examined.	Average Age. (Years.)	Positive Findings.
<i>Colleges:</i>												
A	48	20.47	25	46	20.2	24	2	25.0	1	26 ^a	18.7	1 (4%)
B	59	21.2	22	56	21.0	22	3	24.0	0	17 ^a	20.4	0
C	38	20.58	14	35	20.2	12	3	25.0	2	—	—	—
D	23	20.8	12	21	20.4	12	2	23.5	0	—	—	—
E	34	24.2	8	16	20.9	5	18	27.2	3	—	—	—
Total ..	202	21.3	81 (40%)	174	20.5	75 (43.1%)	28	26.6	6 (21.4%)	43	19.4	1 (2.3%)
Home ..	184	21.6	35 (18.8%)	189	19.9	26 (18.8%)	45	26.6	9 (20%)	50	20.2	1 (2%)
Lodgings ..	14	21.8	3	11	19.9	1	3	28.7	2	7	20.7	0
Total ..	400	21.5	119 (29.7%)	324	20.2	102 (31.1%)	76 (19%)	26.7	17 (22.3%)	100	19.9	2 (2%)

^a From College F.

^b From College G.

and the other at a college, were infected—and both were mildly infected. This 2% female rate of infection as against the 30% male rate is, even when experimental error is taken into account, highly significant. It is a lower infection rate for women than in any other investigation. The reason is by no means obvious and could range from insusceptibility to infection on the part of women to a lack of exposure on their part. The latter explanation seems to me to be adequate, for since feet when infected must be uncovered, the most likely place of infection is in public bathing houses, whether after swimming or after other sports. In these cases the women are always separated from men, so that women's showers *et cetera*, not being entered by unshod men, do not become infected at all, and thus do not transmit the infection. Thus the disease is isolated and segregated by the sexes.

Table III adequately illustrates the effect of living conditions on infections; 19% of students living at home were infected, 21% of students in lodgings were infected, while in colleges an average of 40% of the students were infected. Now, while it is realized that the cleanest-looking bathroom may be infective and that the roughest neglected shower room may not be so, the bathrooms in the colleges are in a very poor condition. To illustrate this by one college, there are two hot showers for 50 students in an enclosure under the dwelling with a cement

floor and drain. The floor is hosed lightly every day, and at that point hygiene ceases. No fungicidal or antiseptic precautions are taken; the floors (except for a small area immediately below the shower jet) are covered in a slime which is not only slippery, but is also a good medium for the growth of fungi. Is it surprising that in this college an infection rate of 52% exists? That this rate is exceptionally high is shown when it is realized that the present infection rate among those who have led any form of corporate life is only 27%.

The unusually low rate of infection for E College is notable, but the increased average age of the students there (twenty-four years as against twenty for the other colleges) and their large number of ex-servicemen partly explain the lower incidence (as the incidence among those at present infected who have led a corporate life is 27%). Nevertheless, though their rate is surprisingly low, there are only five students who have never been infected at some time.

Table VI, covering the effect of corporate life, first divided the students into those who had and those who had not attended either a college or a boarding school or had military service. It was found that 25% of the students had led no form of corporate life, and of these 11% were infected at the time, 23% had been previously infected,

TABLE IV.
Relation between Infection and Age Group.

Group. (Years.)	Total Males.			Males Without Military Service.			Males With Military Service.		
	Number Examined.	Average Age. (Years.)	Positive Findings.	Number Examined.	Average Age. (Years.)	Positive Findings.	Number Examined.	Average Age. (Years.)	Positive Findings.
17 to 19	143	18.4	39 (27.3%)	143	18.4	27.3%	—	—	—
20 to 22	135	20.8	50 (37%)	135	20.8	37%	—	—	—
23 to 25	60	23.7	16 (26.6%)	30	23.3	9 (30%)	30	24.2	7 (23.3%)
26 years and over ..	62	27.7	14 (22.6%)	16	26	4 (25%)	46	28.4	10 (21.7%)
Total	400	21.5	119 (29.75%)	324	20.2	102 (31.1%)	76 (19%)	26.7	17 (22%)

TABLE V.

Summary of Results Obtained at the University of Otago in 1943 by Marples and di Menna upon 568 Students (381 Male and 187 Female).

Type of Subject Examined.	Total Males.			Males Without Military Service.			Males With Military Service.			Total Females.		
	Number Examined.	Average Age. (Years.)	Percentage of Positive Results.	Number Examined.	Average Age. (Years.)	Percentage of Positive Results.	Number Examined.	Average Age. (Years.)	Percentage of Positive Results.	Number Examined.	Average Age. (Years.)	Percentage of Positive Results.
Living in colleges ..	101	21.1	16.8	88	20.7	17.0	13	24.3	15.4	99	20.0	4.0
Living in lodgings ..	149	22.9	16.1	81	23.7	9.0	68	25.5	23.6	27	19.9	7.4
Living at home	131	24.6	20.4	61	21.7	8.0	68	26.8	32.4	61	21.4	6.6
Total ..	381	—	17.8	230	20.9	12.2	151	25.8	26.5	187	—	5.4
Aged 17 to 19 years ..	63	18.6	9.5	63	18.6	9.5	—	—	—	109	18.3	2.8
Aged 20 to 22 years ..	148	20.9	14.2	133	20.8	12.8	15	21.9	26.6	55	20.6	5.5
Aged 23 to 25 years ..	85	23.9	20.0	34	25.7	14.7	61	23.9	23.0	23	26.4	17.4
Aged over 25 years ..	85	28.6	28.2				75	28.3	29.3			

while 65% had never been infected at all; whereas, of the 75% who had led some form of corporate life, 36% were infected at the time, 35% had been previously infected but were now cured, and 30% had never been infected at all (this perhaps suggests some natural ability to resist infection). When these are converted into percentages of the total 400 students the results are as shown in Table VI.

Analysis of the effect of corporate life on women was not of value, as both the infected subjects found had been to boarding school. However, 23% of the women had at some time been infected, but were now cured, but of these only one subject had not led some form of corporate life.

Treatment.

Whitfield's ointment had for many years been the universal panacea for all fungous infections, but it is by no means the best for all patients. It is good for the dry, scaly type of lesion, but for the moister type, a salicylic-benzoic acid preparation in alcohol is better—for example, "Mycosol". However, the new product, undecylenic acid, seems to be even more satisfactory, and compounds of it such as "Dermecyl" are the most effective. Iodine, the organic mercurials, *Tinctura Benzoini Composita* and methylated spirit all have their advocates, but except in mild cases are not so satisfactory. Interment in a closed container of formalin for forty-eight hours will disinfect boots and socks. Whatever the treatment, the most important point is that it should be applied regularly and frequently for a start, and with diminishing frequency for up to three months. The danger of an allergy to the drugs used in treatment, or of using too high a concentration of them, should be carefully guarded against.

The following application is used: benzoic acid 15 grains, salicylic acid 20 grains, coconut oil one drachm, soft paraffin to one ounce.

"Dermecyl" ointment (Drug Houses of Australia) contains undecylenic acid (10%) and zinc undecylate (5%).

Conclusions.

Any conclusions drawn from this survey must be considered in relation to possible experimental error, in relation to method, and in relation to the fact that only 500 students were examined (out of a total student population of under 2000). Thus the deductions can be applied only to students (and not to the whole community), and only to students in the University of Queensland.

Most overseas authorities submit that infection rate increases with age, whereas this has not been the finding of this investigation, as the rate reaches a maximum in the twenty to twenty-two years age group, and thereafter declines. Of course most investigations have been carried out on a seventeen to thirty years age group, and it is

TABLE VI.
Relation between Infection and Corporate Life (Men Students).

Status.	Those Who have Led Some Form of Corporate Life.	Those Who have Led No Form of Corporate Life.	Total.
Infected now ..	108 (27%)	11 (3%)	119 (30%)
Never infected ..	89 (22%)	65 (16%)	154 (38%)
Previously infected (now free) ..	104 (26%)	23 (6%)	127 (32%)
Total ..	301 (75%)	99 (25%)	400 (100%)

possible that their age of maximum incidence would be above this, thereafter declining; whereas here there is a lower age of maximum incidence, owing perhaps to earlier infection. Henrici, an authority on fungous infection, suggests that repeated inoculation and infection lead to immunity, and this would imply, as was found here, that there should be an age of maximum incidence.

Another point of difference of these findings from those of other investigators (particularly Marples and di Menna, of the University of Otago), is that infection rate among ex-servicemen is lower, even in their own age group, and in the same environment, than among those who have had no military training. Whether this is due to their acquiring an immunity due to repeated infections, or merely to the time which has elapsed since the war to permit cure, is open to speculation. However, the figures conclusively show that corporate life is a most important factor in the production of infection, and in this respect all investigators agree; but Marples and di Menna quote 16.8% infection rate in colleges of a total average of 17.8%, whereas in the present survey a 40% infection rate in colleges was found in relation to a total average of 30%. This shows that colleges need not be the foci of infection that they have become in Brisbane.

Generally the condition is one which is completely disregarded from any public health standpoint, all preventive measures being left to the individual. Infection can be prevented completely by wearing rubber shoes in public showers, dressing-rooms and bathrooms, but owing to the inconvenience of carrying them, their use is impracticable. Once infection has occurred, a cure by any means is difficult, extended and a nuisance, as for as much as three months from an apparent cure, the infection which has lain dormant may newly erupt. Moreover, non-boiling woollen and silk socks can become a source of repeated infection, as can shoes, so that, apart from discarding all shoes and socks and buying new cotton socks and new shoes at the beginning of treatment, reinfection is common, and cure probably involves the difficult development of immunity.

Little is known of the infectivity of wet cement floors or of how long they remain infective once they have become infected, or of agents which, on floors, will kill both the fungi and their spores. Footbaths can hardly be of any great value because of the short duration of contact they allow. Any programme of control is a difficult and tedious one for both the infected and uninfected alike, but unless something is attempted, the incidence of this infection will continue to increase.

Particularly as the disease is undramatic, non-fatal and non-epidemic and has few serious symptoms, it fails to capture even a mild interest on the part of the public, let alone to call for any public health activity which would require the cooperation of the people. However, in institutions such as the university, especially the colleges and the resident medical officers' quarters at the hospital (where numerous people have been first infected), the position should be realized and measures taken to disinfect the causative focus.

As long ago as 1929, Legge, Bonar and Templeton, in their preliminary report, wrote as follows:

One of the biggest problems in public health work that is at present interesting college physicians, physical educators, military and individual organizations, athletic clubs and bathing resorts is that presented by epidermomycosis—fungal infections of the skin commonly called tinea.

And now the matter stands as it did then—a few people are mildly interested in the position and willing to attempt to rectify it, but unable to do so because they lack the public support essential to success.

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INVESTIGATIONS INTO THE ÆTIOLOGY OF GLOMERULONEPHRITIS: PRELIMINARY REPORT.

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ALTHOUGH the name of Bright is justly linked with the full clinical description of the disease complex bearing his name, two earlier physicians, Swift and Blackall, had previously described the occurrence of oedema and hæmaturia associated with disease of the kidneys. However, it was following Bright's masterly clinical description of the condition, as observed in a drunken tailor admitted to Guy's Hospital in 1827, that the condition was clearly separated from the limbo of the "dropsies".

Since Bright's delineation of the complete syndrome little has been added to the clinical observations of the fully developed condition, but many theories as to ætiology of glomerulonephritis have emerged. Of these, the allergic theory put forward by Schick in 1907 on a clinical analogy with serum sickness has been most constantly supported in the present century, and has led to an appreciable volume of experimental work designed to give support to this hypothesis.

Pearce in 1903, using rabbits and dogs as his experimental animals, was the first to observe acute kidney lesions after injection of "nephrotoxic" sera. Masugi in 1934 repeated these experiments but extended them by observing his animals for a longer time. He noted that the acute stage of the disease produced by heterologous nephrotoxic serum could pass into a chronic phase without further injections of the serum.

The experiments entail the production of nephritis in one animal species by introduction of serum produced in another species by injection of kidney extract from the first. That is, heterologous material only was used.

On this basis the nephritis has been explained as due to damage to the kidney by organ-specific substances developed in a heterologous serum.

Recently much experimental work has been performed on nephrotoxic nephritis with specialized techniques so different as diazotization, radioactive labelling, and differential centrifuging speeds (Elsen and Pressman, 1950; Greenspon and Krakauer, 1950). The results from all these refined methods are in close agreement, and all indicate that the significant material in nephrotoxic nephritis is derived from the glomerulus.

The other main line of work has developed from that of research workers in many divergent fields of endeavour, all of whom have tried to demonstrate that homologous protein extracts also may act as exciting agents *in vivo*. Investigations on eye lens and skin proteins have been performed by a number of independent workers. More recently brain and kidney extracts have been used (Morgan, 1947).

Some experimenters, by extension of this notion, have shown that homologous proteins (that is, protein extracts from the same animal species), if altered in some way, can become active agents *in vivo* and induce antibody formation. The word "denatured" has been used for the alteration produced in the homologous extracts.

The two independent lines of investigation appeared to find synthesis in the work of Schwenker and Comploier in 1939, when they produced antibodies in rabbits to homologous rabbit kidney extract treated with bacterial toxin. At the same time this work gave clinical significance to a theory that had remained only in the realms of the laboratory.

When one collects clinical evidence for the postulation of a sensitivity mechanism in the ætiology of nephritis one finds that an appreciable amount of data can be assembled. First, the onset of the condition is to be considered. It has been well recognized that the onset

of the nephritis is often preceded by an infection, usually by a streptococcus, but often by a staphylococcus or some other organism. It has been shown, for example, that the curves of incidence of nephritis follow those of streptococcal infections. All the preceding conditions have in common the ability to injure kidney cells by means of the toxins they produce.

Next, the latent period between the preceding infection and the onset of the nephritis corresponds with the time usually postulated for the production of antibodies. This latent period is shorter for exacerbations, and this would be in keeping with the anamnestic response to further antibody formation in a previously sensitized animal. Part of the explanation of chronicity might well be found in this fact.

A drop in serum complement has been shown to occur at the onset of nephritis and during exacerbations (Reader, 1948). Though other explanations are possible, such a drop in serum complement is usually taken as indicative of the occurrence of antigen-antibody reaction.

That the nephritis is not just the immediate result of the streptococcal infection follows from several observations. In the first place, the severity of the predisposing infection, as, for example, measured by the intensity of local and general disturbances as in a tonsillar infection, bears no relation to that of the ensuing nephritis. Also the onset of the nephritis has been shown to correspond to the time when the blood shows its maximal streptolysin titre. Finally, on the side of negative evidence, it has been shown that when the reticulo-endothelial system was injured by X rays, animals that should have developed nephrotic nephritis failed to do so (Swift and Smadel, 1937).

Experimental Work.

Originally the experimental work planned was separated into two main sections. A series of animal experiments was planned in which an attempt was to be made to produce the full clinical picture of nephritis by means of a method based on the human clinical sequence, and to show a correlation with the clinical picture and the appearance of antibodies to homologous kidney extracts. This work was to be a modification of that performed by Schwenkter and Comprior, but has not yet been performed.

With the object of developing techniques only in mind, a preliminary experiment was performed, in which two rabbits were injected bi-weekly with a mixture of homologous rabbit kidney extract and streptococcal toxin incubated for twelve hours at 37° C. The rabbits' sera were tested bi-weekly for antibodies to homologous rabbit kidney extract, a collodion-particle technique being used to indicate the end-points. After eleven weeks both animals developed titres to homologous kidney treated with streptococcal toxin of 1:16 and 1:128 respectively. At this time the animals were sacrificed and the organs sectioned. Of the organs examined, the kidneys alone showed any significant pathological lesion. The lesions were typically a glomerulitis with very little change in tubules or interstitial tissues. This work was quite separate from the animal experiments planned, and was performed only with a view of developing techniques.

The aim of the present work was to investigate the serum of patients with nephritis and to try to demonstrate the presence of some substance or "antibody" which would react in a serological system with homologous human kidney extracts.

Methods.

Material Used.

Kidneys were obtained from autopsies within twelve hours of death in nearly all cases. The kidneys chosen were macroscopically normal and no obviously infected material was used; they could not be assumed never to have come under the influence of an infection. Both adult and infant kidneys were used. Adult material was found to be more satisfactory to work with, but tests performed

simultaneously with extracts of adult and infant material produced comparable results.

Preparation of Extract.

Kidneys were perfused with saline during the autopsy, whenever possible. The capsules were stripped, and all fat, fibrous tissue and blood vessels were carefully dissected away. The kidney parenchyma was cut into small cubes and washed thoroughly in a number of changes (four or five) of cold, fresh, 0.85% saline until most of the blood, as judged by blanching of the material, was removed. A purely physical method was used for the subsequent extraction. The material was macerated for two or three minutes in a chilled Waring Blender. A thick even paste of kidney material was thus produced. The paste was placed in a large wide-mouthed dish and liquid oxygen was poured on whilst the material was stirred to ensure that the liquid oxygen penetrated to the depths of the material. The frozen material was allowed to thaw at room temperature. This took from one to three hours. The freezing and thawing process was repeated three times. After the last thawing, the material was shaken in a large flask with a mixture of distilled water, chloroform and amyl alcohol in the proportions suggested by Sevag in 1934. After being shaken at about 100 times per minute for sixteen hours, the supernatant fluid was removed by decanting and centrifuging; the supernatant fluid then was mixed again with fresh amyl alcohol, chloroform and water. This process was repeated three times, and after the last shaking the supernatant fluid was freeze-dried. The material obtained yielded a weak Biuret reaction and a strong Molisch reaction.

Attempts were made to remove the last trace of protein from the material. Fractional precipitation with acetone and alcohol was tried, as well as the use of the Sevag principle of deproteinization by shaking up to eight times. The removal of the last traces of protein by these methods proved to be not feasible, so that, as described above, it was decided to stop the shaking after the third day.

The dried material did not appear homogeneous in colour and was in the form of a flaky pale-lemon powder with a faint greenish tinge. For use it was weighed and prepared as a 20% solution in cold double-distilled water. A few drops of 1:10,000 "Merthiosal" were added if the material was to be kept for longer than a week.

Preparation of Collodion Particles.

The original description of Cannon and Marshall (1940) has been modified by quite a number of workers on collodion particles (Cavelti and Cavelti, 1945; Eisler, 1941). The principles for the production of an active stable particle appear to be: (i) the exclusion of metallic ions in the preparation; (ii) the production of particles of such a size as will give good visible end-points, but will not give self-agglutination. A particle size between 0.5 μ and 4 μ seems to be the most effective size.

With these points in mind, all the glassware, including a specially made glass stirring rod, was washed according to the following procedure. The glassware was first rinsed in singly distilled water, then in a mixture of 2% alcohol and 40% potassium hydroxide solution. The apparatus was then rinsed again in single distilled water, then washed three times in *aqua regia*. Finally the glassware was rinsed five times with double distilled water and wrapped in "Cellophane" until used.

About 200 grammes of commercial Felton's non-flexible collodion was poured into two litres of double-distilled water, being stirred constantly with a thick glass rod. The collodion separated out as an amorphous mass, which was squeezed manually free of water and dried at 37° C. in an incubator. When quite dry the mass was weighed and a 5% stock collodion solution was made up in acetone and kept in a dark glass bottle.

When particles were required, about 100 millilitres of the stock solution were poured into a round-bottomed glass flask suspended in a water bath at 40° C. Into the flask a glass stirrer set to rotate at 1000 revolutions per minute

was lowered. At the same time a fine stream of a mixture of water and acetone in a three-to-one ratio was added whilst the stirrer was in motion. The collodion mass separated out, leaving a cloudy suspension of particles which was decanted. The separated collodion mass was redissolved in acetone at 40° C. and the process repeated three times. Fourth and subsequent suspensions were poured into a suction flask containing 300 millilitres of chilled double-distilled water.

When enough particles had been produced the suction flask was attached to a water aspiration pump and air was bubbled through the particles until the smell of acetone had disappeared. This took about three days (though other workers have reported much shorter times for this stage).

To segregate useful particles centrifugation was used. The particles were first spun at 2500 revolutions per minute for five minutes. The supernatant fluid was decanted and was spun again for 2500 revolutions per minute for one hour. The precipitate was added to that from the first spinning and the combined precipitates were now resuspended in a conveniently smaller volume of double-distilled water and spun again for one hour at 2500 revolutions per minute. The particles were further washed thrice by being suspended in water and spun at hourly intervals.

Finally the washed particles were resuspended in a conveniently small quantity of distilled water and spun at 3000 revolutions per minute for three minutes and the precipitate was discarded. In this way very uniform particles, which were fairly stable, were obtained. Some of the particles lasted as long as three weeks before showing self-agglutination. The size ranged between 1 μ and 4 μ in diameter, but most of the particles were uniformly about 3 μ in diameter. When required for use the concentrated particles were diluted with double-distilled water to correspond to tube 8 on the Wellcome turbidity scale.

Sensitization of Particles.

A suspension of particles was treated with kidney extract by simple mixing with an equal volume of the 20% kidney extract; this was found most effective if allowed to stand overnight in a water-bath at 37° C. before use. Some workers have suggested that the treated particles should then be precipitated and resuspended to remove excess extract. In this laboratory this procedure has been found unnecessary, because it was not found to affect sensitivity.

Collection of Serum.

Blood was collected by means of a dry sterile syringe from the cubital vein in adults and most children. In very young infants on several occasions the femoral vein was used. The blood was immediately transferred to a dry sterile test tube. Incubation of the blood at 37° C. for half an hour was carried out, as this procedure helps to ensure sterility. After this incubation the blood was centrifuged and the serum pipetted into sterile dry tubes if they were to be used immediately, or into sterile ampoules, with 1:1000 "Merthiosal" solution added if the serum was to be kept for more than a few days. Before use serum complement was inactivated by heating at 56° C. for half an hour.

The Test.

Doubling dilutions of the serum were prepared with normal saline in ten thin glass Wassermann-type tubes, beginning with a 1:5 serum dilution. To these dilutions was added an equal volume of the prepared particle-kidney extract mixture. The final unit volume was 0.5 millilitre. Two controls were always performed with each test, one containing the first serum dilution plus untreated particles, and the other containing extract-treated particles plus saline.

The tubes were shaken vigorously by hand and allowed to stand at room temperature for three hours. They were then spun at 1500 revolutions per minute for three minutes to facilitate the reading of end-points, then the tubes were shaken to resuspend the particles. A positive

agglutination was indicated when the particles became visible to the naked eye and the surrounding solution appeared clear when viewed with a desk lamp of 60 watts. "Negative" tubes (no agglutination) maintained their standard uniform turbidity due to the suspended particles.

Results.

Specimens of serum of 62 subjects of nephritis, including a wide range of cases, and serum of 27 "controls" were tested. The specimens from controls were a very mixed lot, including serum from normal healthy people, some from those sent for Wassermann tests to the University of Melbourne, and the rest from patients at the Children's Hospital suffering from such diverse conditions as rheumatic fever, infectious mononucleosis, hydatid disease, submandibular abscess, ulcerative stomatitis, infective hepatitis, gastro-enteritis, congenital heart disease, leukaemia and a psychological condition.

To ensure that different groups of tests were comparable, the following precautions were taken whenever possible. A few non-nephritic control serum specimens were tested at the same time as the nephritic specimens, and serum from a subject of nephritis which had on a previous occasion given a high titre was retested.

When all the cases of clinical nephritis are taken together, in 12 cases no reaction was obtained to the kidney extract and the average titre in the "positive" cases by this method falls around 1:80 serum dilution. The cases of nephritis have been further subdivided into two groups: cases of rapid onset of not more than a week's duration, with either constitutional symptoms or haematuria predominating—this forms group "X"; other cases of nephritis or group "Y", including all the smouldering, prolonged, active cases, the subacute cases and the cases of chronic nephritis. This subdivision has been made because, in general, the prognosis corresponds to such clinical manifestations. The results of the tests were of interest in this regard, as in group "Y" (19 cases) no failure to react with the kidney extract occurred; the average titre in this group was 1:160 serum dilution. In group "X" (43 cases) no reaction to the kidney antigen was obtained in 12 cases, and the average titre in this group was 1:40 serum dilution.

Of the control 27 non-nephritic cases, no reaction to the kidney extract occurred in 14 cases and positive reactions occurred in 13 cases, but the average titre of the positive results was 1:10 serum dilution and the maximum 1:40.

Specimen titres of the groups are shown and the positive titre distribution is represented graphically in Figure 1.

A statistical analysis of the results has produced the following conclusions on application of the χ^2 test with correction for continuity and one degree of freedom. $\chi^2 = 5.67$. A figure as high as this would make it safe to postulate that the sera of nephritic and non-nephritic patients behave differently towards normal kidney extract prepared as described.

Discussion.

The appearance of the dry kidney extract is such as would indicate that it is probably not homogeneous. It was a flaky powder with a faint greenish-brown coloration. Different batches prepared were not of exactly the same colour. Chemically the powder gives a strong Molisch reaction for polysaccharide and a weak Biuret reaction for protein, so that it can be assumed to be predominantly polysaccharide in nature. A method of assay which could well prove feasible is the biological one, in which a rabbit has been injected with the extract and a high titre serum obtained. This serum could then be used as a standard for testing fresh batches of extract. The material still contains some protein and the roles of the components of the extract still require elucidation. The small protein moiety may be important.

A number of different workers who have investigated the comparative results with the collodion-particle and other serological techniques have reported favourably on the collodion-particle method (Cavelti and Cavelti, 1945; Eisler, 1941; Goodner, 1941).

When the collodion-particle technique was being established, comparative tests with this method and the Dean-Webb precipitin method and a haemagglutination technique were performed with the same components. Results obtained with the collodion particles compared favourably as regards both titre and end-point with those of the above methods.

Once the technique of the serological test has been established, a large number of serum specimens could be tested simultaneously without much difficulty. The specimens can be stored for some time in ampoules, and although the serological activity has been found to deteriorate slightly in some cases, the impression has been that it remains fairly stable for a number of months and does not fall by more than two dilutions in the titre scale.

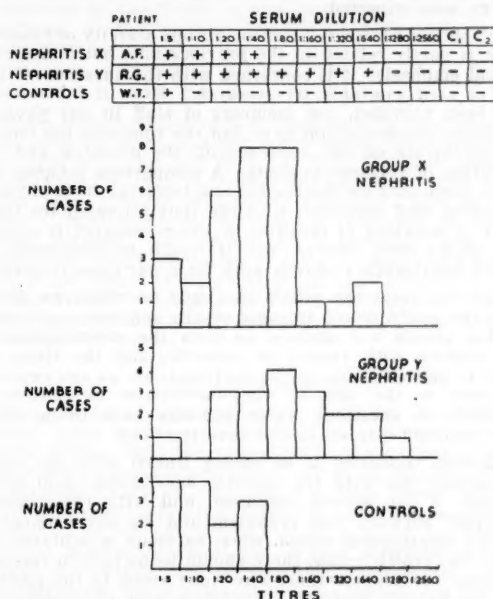


FIGURE I.

Although the results obtained would indicate that the serum of patients with nephritis does react with a kidney extract differently from that of non-nephritic subjects, this may apply to other kidney conditions and thus play no definite role in the aetiology of nephritis. Another series of tests is being performed with serum from patients with other kidney conditions as well as from patients with nephritis.

The presence of positive titres in the control group is to be expected, as there is no way of excluding, with any certainty, the occurrence of kidney disease in these cases.

Low titre readings in the cases of nephritis are found in those of rapid onset with the more dramatic clinical manifestations. In these cases higher titres may later develop, but the rapid improvement in regard to symptoms with correspondingly rapid discharge from hospital has made it very difficult to follow the serological pattern. Of great interest is the small group of cases in which the high positive titres are found. It is in these cases that we see fully developed nephritis, and in this group we find that the prognosis is in general unfavourable.

A working hypothesis for the nature of the reaction would be as follows. The collodion particles, when treated with the kidney extract, retain a charge which still maintains the suspension, and this charge is neutralized by some serum constituent when a "positive" serum is used.

It is tempting and perhaps reasonable to advance the further hypothesis that the serum constituent (or con-

dition) develops as the result of glomerular or tubular damage which in some way implicates the polysaccharide. The extracts, however, were prepared from the kidneys of clinically non-nephritic patients. Extracts from other tissues and from other animals have yet to be tested.

The experiments here recorded do not provide evidence warranting conclusions on the nature of the polysaccharide, on the nature of the serum constituent (or condition), or on how this develops, or on a specific relation between them in that development.

So far we have only a curious reaction which may well prove to be as non-specific in its nature as the Wassermann reaction.

Summary.

1. Specimens of serum from 62 patients clinically suffering from nephritis and from 27 other patients clinically free from kidney disease were, after being heated at 56° C. for half an hour, tested by observing the effect of saline dilutions of them on the stability of a suspension of collodion particles which had been incubated overnight at 37° C. with a human kidney extract.

2. The details of the purely physical method of preparation of the kidney extract and of the collodion particle suspension are described and the titration procedure is outlined. A strong Molisch reaction and a weak Biuret reaction indicate that the kidney extract is predominantly polysaccharide in composition.

3. Differences of range of agglutination titre by serum dilutions were observed between: (a) serum specimens from patients with clinical nephritis and those without; (b) serum specimens from patients with nephritis of rapid onset and those with nephritis of slower onset and longer duration.

4. An hypothesis of the nature of the reaction is briefly discussed. It is held that these experiments do not in themselves warrant conclusions specifically connecting the polysaccharide with the development of the condition demonstrated in the serum of patients with nephritis.

Conclusions.

1. Differences between patients without clinical signs of nephritis and those with evidence of kidney disease at various stages have been demonstrated by the effect of dilutions of their serum on the stability of a collodion-particle suspension treated with the predominantly polysaccharide human kidney extract described.

2. The overlap of titres between the clinical groups does not permit sharp distinctions to be drawn by this technique as at present developed, but the statistical analysis of the figures appears to indicate that it measures a change in serum constitution significantly related to the occurrence of active clinical nephritis.

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RESEARCH IN PHYSICAL EDUCATION AND RELATED SUBJECTS, WITH SPECIAL REFERENCE TO UNIVERSITY DEPARTMENTS OF PHYSICAL EDUCATION.¹

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UNIVERSITIES as institutions of higher learning should not only train future leaders of the community in various fields, provide them with knowledge and equip them with broadness of mind which will enable such future leaders to apply their knowledge to the best advantage, but universities should also be able to provide the community with guidance and advice, based upon unbiased, scientific conclusions, with regard to the facts underlying and concerned with individual and group life. Thus the two important and to a great extent interrelated tasks of universities—and indeed of each university department—are those of teaching and research.

As far as one can judge, physical education departments in our universities have done well in their task of "teaching"; they have produced a considerable number of men and women who, equipped with essential knowledge, and inspired with great enthusiasm, have acted and are acting as valuable leaders of our community in the field of physical education. But our departments have so far hardly entered the field of research, and the following five factors can be cited as being responsible for this lack of research:

1. All Australian university departments of physical education are of relatively recent origin, whereas research demands "tradition".
2. Research today is largely a matter of team-work, and owing to their relative newness in Australian universities, no intimate connexion between physical education departments and other (and older) research agencies has been established.
3. In our departments no provision for properly equipped research laboratories is made, and investigations into various aspects of physical education are limited to the

collection and evaluation of data, the origin of which has not always been under strict scientific control.

4. Scientific research work by its very nature can give neither quick nor always positive results; it can well be called an "intellectual adventure", and it is not only based upon but is in itself an experiment. However, the establishment of physical education departments in our universities was the response to an immediate and closely defined need: the lack of trained teachers of physical education in schools and in other fields of physical education. The exclusive concentration of our departments upon the training of physical education teachers and leaders is thus understandable, and was fully justified in the past. Immediate needs had to be satisfied; experiments were to be limited in scope, and "adventures of ideas" would not have been looked upon with favour when and where practical results were expected.

5. The last reason to be given for our scarcity of research work is partly related to the previous one, but it deserves special emphasis; it is concerned with the question of time and of staff available for research. Even if laboratories had been provided, few members of staff in our physical education courses would have had the time and the leisure to concentrate on the development, the planning and the execution of research projects. A comparison between the hours demanded for instruction and lecturing from physical education staff members, with the time allocated for these tasks to members of faculties in which research is carried out, shows very clearly why it would be impossible to expect worthwhile research work from our departments.

However great the satisfaction may be which we derive from the teaching and training results achieved, such satisfaction should not distract us from the shortcomings of our courses with regard to research, and the time has come to pay attention to the contributions we are expected to make to the task of our universities as centres of guidance in questions whose answers have to be based upon scientifically conducted investigations.

Physical education is so closely linked with the whole of human life, with the growth, development and maintenance of the human organism, and with the dynamic interplay between this organism and its environment—a mutual relationship which, when harmony is achieved, we may call "health"—that there should be no lack in research subjects. Neither is there any limit given to the possible and the logically desirable cooperation with other university departments. The suggestions as to fruitful research subjects made later in this paper should therefore be regarded as selections only, selections dictated partly by personal interests, partly by a conviction of the special importance, if not urgency, of the subjects listed. In no way is an attempt being made to give a complete enumeration of the problems confronting physical education today. If a comprehensive view of these problems is required, reference should be made to the excellent volume "Research Methods Applied to Health, Physical Education and Recreation", published by the American Association for Health, Physical Education and Recreation in 1949, under the auspices of the National Education Association.

If we now endeavour to draw a map of the research field in physical education, we have to keep in mind the following (Wootton, 1950):

All scientific research depends for its fruitfulness upon an interaction between the work of the professional student and attitudes of the public at large. The professional student must be faithful to the discipline of science and vigorous in his application of scientific method; but he is not likely to get very far in a social environment which is sceptical of his usefulness, if not actually hostile to him.

Following such seasoned and wise guidance we may well conduct our research with the intention of answering Professor Steinhaus's question, "how are we to know that we are teaching the right things, in the right way, to the right people, at the right time?", thus enabling our research to lead us as near as possible to the important interaction between the professional student and the attitude of the public.

¹Read at the conference of University Directors of Physical Education, Melbourne, May, 1951.

THE RIGHT THINGS.

In relation to "the right things", the investigation is primarily concerned with our activities, and the word "right" demands explanation. "Right" can never be an absolute (that is, dogmatic) conception; it denotes the relationship which in "matters living" is always far from simple. The right things, or activities, have first to be right with regard to the human beings by whom they will be practised, and right also with respect to the environmental conditions of these people. Thus two lines of research will have to be developed. The first relates activities to people, and the physical education research worker will turn into directions which are indicated by anthropometry, physiology, body mechanics and psychology. The other line, relating activities to environmental factors, will lead us to history, sociology and anthropology. The answer as to the "right things" will then emerge from a synthesis of the research results of both lines of the investigations indicated above.

THE RIGHT WAY.

It has often been stated that what we do is less important than how we do it, and the result of our investigation of the right activities will naturally form the basic premises from which we can start our research into "how to do them", and perhaps even more important, "how to apply them". How to do, in the sense of technique, is investigated through the science of kinesiology and body mechanics. The investigator of "how to apply" will have to add to the results in kinesiology and body mechanics those of educational investigators, whose findings will also be based upon the results in psychology and in physiologically substantiated mental hygiene rulings.

THE RIGHT PEOPLE.

The question of "the right people" will have to form the central focus of all our research in the still valid sense of Pope's dictum that "the proper study of mankind is man". There is no science which should not be called upon in this study, and which, in fact, has not been called upon in modern physical education research. There is no need to enumerate all the contributory sciences which are deepening our understanding of the human organism and the human personality, and considerable interest will always be centred on the growing organism—that is, on the first two decades of our existence. In this respect an impressive amount of research findings is at our disposal from other countries, and in Australia itself much has been done already—for example, the Lady Gowrie Centre investigation on the growth of the pre-school child, and the more recent Commonwealth Posture Survey. However, there is a need for our university departments of physical education to make definite proposals and to start research projects in cooperation with medical, psychological and educational departments. These projects when linked with students' health services could furnish most valuable data as to the health and fitness situation of the Australian student. Even in the group most easily accessible to investigation, the school population, we are rather ill-informed about the effect of physical activities either in general or for special purposes, and decisions as to the desirability of so-called "formal" or "informal" activities, the value of postural work within the ordinary physical education period, the application of a systematic body training to all children *et cetera*, are often badly lacking in scientific substantiation. There can be little doubt that universities should be places where a stockpile of knowledge and scientific data is established for the defence of the "land of health", and from where such accurate information is to be disseminated.

It is understandable that in the proper study of man, since the choice of which science we should turn to for guidance is so wide, certain time-conditioned trends will become rather outspoken—as, for instance, the purely experimental method and its mathematical-statistical evaluation. It should be taken for granted that this research method is of the utmost importance in finding the right answer in our search for the right people; too often

have guesswork and mere personal experience or opinion led us astray. Nevertheless, the following warning by one of the leaders in this search for the right people deserves attention; I quote from K. A. Menninger's impressive contribution to "Research in Medical Science" (Green and Knox, 1950).

Some of the classic postulates of experimentation, namely, the repeatability of experiments and consequently the statistical method of proof, are not, the essence of experimentation.

Thus a new concept of experiment has developed in modern psychology like in modern physics. In the latter the astronomical proof of the theory of relativity consists of the observation of stellar phenomena predicted on the basis of this theory rather than on laboratory experiments with artificial set-ups.

This new conception of experimentation seeks not reproducibility but predictability, not statistical frequency but lawfulness of the individual event.

Menninger's last paragraph is in full agreement with the statement by one of the leading research workers in physical education, A. H. Steinhaus: "The final test of science is not the ability to change phenomena but to predict them." In the same way the final purpose of the modern science of body types and constitutional medicine is "predictability", and the contributions made by Kretschmer and, more recently as well as more thoroughly, by Sheldon and his co-workers, are most valuable in determining—that is, predicting—the probable reactions of the right people to the right activities.

Another field will be open to the physical education research worker once we give the word "right" its proper individual meaning. There is much the physical educationist should have to say when it comes to all those who are either temporarily or permanently handicapped in body, mind or soul, and whose organism and personality can be helped by the adequate choice and application of physical activities. Plato's "gymnastics and medicine are sisters" is today only timidly translated into practice. Definite and convincing research results, based as they should be on unbiased investigation, will either do away with an empty phrase or will create, as we believe, a solid and vigorous family life in which both these sisters can fully participate. The handicapped person should, after having gained much from his more passive contact with the physiotherapist, enter into an active relationship with the physical educationist, and clinical, observational and experimental research should provide us with the main data to make such active relationship as beneficial as possible.

Near to the outspokenly handicapped we find the two large groups of "convalescents" and of the many who are "never really well". Nearly 2000 years ago the great Galen clearly indicated our tasks in respect of these two groups when he spoke about the three phases of health: the unstable (which conforms with the convalescent), the habitual (corresponding to the rather doubtful health of the "man in the street"), and the perfect (which should be the aim of all our efforts). But here, too, definite action will depend on systematic research in the fields of medicine and public health; as an example of such work the Peckham pioneer health centre may be mentioned. We can be sure that a thorough health examination of our university students would confirm many of the Peckham findings, especially with regard to Galen's "habitual state of health", which is responsible for a great deal of unfitness during the middle and later years of life.

One last group of people should have our consideration, a group to which in coming years physical education will have to pay greater attention: the middle-aged and especially the older people. We are living in an aging population, and it is significant that a number of recent medical congresses and conferences have appealed to the science of geriatrics to supply the physician with the necessary background data. We, too, as physical educationists, need more knowledge of the aging organism and of its reaction to activities, and a widening of our research field in this direction would be desirable.

THE RIGHT TIME.

Little need be said under the heading of "the right time", as it is obvious that in any dynamic—that is, living—conception of the interrelationship between the human personality and physical activities the question "when" will have to be incorporated and will therefore have to find its place in any research project concerning this interrelationship.

One "time" question, however, demands special thought: the one which is linked with the place of physical education during the day. The subjects of fatigue and recreation (recovery) are largely matters of time, and the energy metabolism of the human being, so thoroughly explored with regard to energy expenditure, is less well known as to the time and procedure required for energy restoration. Different age groups seem to have varying needs for rest and sleep, and the information about the ten hours sleeping day for babies, the daily rest periods during puberty, the adolescent age of the "sleepless nights" *et cetera*, is still mainly the result of individual and unrelated observation. Detailed age group and occupation investigations would also lead to a more scientific approach to such questions as the place and time of physical education in the school time-table, in which already the old, but fallacious, opinion is losing ground—that physical activities can act as a kind of mysterious revitalizer after concentrated mental work. The release of pent-up emotion is rather different from the recharging of the human battery, even if certain similarities in the outer appearance of the two features may impress the casual observer. Here, too, research will have to be linked with the type of work indicated under previous headings.

THE POSSIBILITIES FOR RESEARCH WORK IN PHYSICAL EDUCATION.

We now may proceed to a brief survey of the possibilities for research work in physical education as seen by the physical education departments of our universities. This approach is certainly more limited in scope compared with the one we have followed so far. However, it will allow us to consider more closely the demand for interaction between the research worker, the teaching staff in the department, and the worker in the field. Thus this approach may help to remove the obstacle which is so often placed in the way of scientific research by a biased discrimination between theory and practice. Such discrimination has done untold harm to the development of physical education in our own country. It should be made clear to all those who hold such discriminatory views about practice and theory (to place them in order of unscientific preference) that practice without a well-proven and investigated background of facts, resulting from scientific research, is at best wasteful and in most cases will do harm, and that theory remains sterile and an empty plaything if it is not directly or indirectly related to the requirements of the worker in the field. (With regard to "philosophical research methods", I must refer the reader to the very clear article by L. S. Cobb in "Research Methods Applied to Health, Physical Education and Recreation", 1949.)

Research work in physical education may be divided into the following two groups, which are naturally and often interrelated.

(i) Research in the field of physical education proper: (a) history of physical education (historical and library research); (b) effect and suitability of physical activities (physiopsychological, anthropometrical research); (c) standard values, testing, and techniques of physical activities (kinesiological, anthropometrical, statistical research); (d) educational background and procedures in physical education (psychological and educational research).

(ii) Research related to and with other fields: (a) correlation between physical and mental activities; (b) correlation between physical education and a given sociological setting; (c) correlation between physical education and medicine.

Research in the Field of Physical Education Proper.

In the field of physical education proper, results may be expected in two directions: firstly, results of actual research work, mainly to be carried out by the department's own staff members, often in collaboration with other investigators; secondly, the introduction of final-year students (in courses lasting longer than two years) to scientific research, the graduands thus being given an understanding for and of various research methods and an appreciation of such work.

History of Physical Education.

Research into the history of physical education will lead to research about the development of the ideas of physical education through the ages, in different countries and with different cultures. Special attention will have to be paid to the developmental background of contemporary physical education in our own and other countries.

History is not just a recording of facts, but should include their evaluation for us. The recognition of the origin of many of our conceptions is often the only way to their full understanding. As Winston Churchill once said, defending a budget brought in by Lloyd George: "A new question has arisen. We do not only ask the taxpayer, 'How much have you got?', we ask, 'How do you get it?'" Thus we may well demand that our historical research should deal with "living past", which will radiate a light in which all our achievements and difficulties will stand out far more distinctly than ever before.

Historical research, furthermore, is an excellent introduction to library research, which besides its own intrinsic value has to be strongly recommended as a student-project; the advantages of this are obvious to all who have had to do with the education of teachers.

Subheadings for the historical research would be: (i) keep fit and physical training for special purposes such as war, work and, generally, the struggle for and of life; (ii) physical training for health purposes; (iii) the recreational and pleasure idea, including play; (iv) educational ideas, including political ideas; (v) wider cultural ideas, including religious ideas.

All these investigations will have to explore the underlying principles of their respective methods, and whenever possible original sources should be consulted, as second-hand quotations and some translations are rather distorted and misleading.

Effects and Suitability of Physical Activities.

Under the heading of effects and suitability of physical activities with special consideration of different age groups and body types, we would have to list a great number of projects which need the closest cooperation with other university departments, such as the schools of anatomy and physiology. The work here would be done mostly by staff members, whereas students would get an introduction into the methods employed by acting as research subjects.

Suggested subheadings may be as outlined in the following paragraphs.

1. Outer appearance and physical activities. The research worker would use mainly anthropometrical methods and would investigate growth, different human types and their physical and psychological reactions; he would have to note changes of body build during growth and the influence of physical activities upon the growing organism. Important contributions could also be expected from the science of constitutional medicine, and much valuable material could be gained from students' health examinations.

2. Effects and suitability of physical activities upon and for the organism. Here the possible lines of investigation are numerous indeed. The whole field of work and fatigue in its mechanical (physical), chemical, psychological and integrational aspects is open to research, and each single ramification demands its special technique and laboratory equipment and its highly developed methods of evaluation. Most of these research projects are long-term investigations, very often requiring a special research staff. This is not

stated with the intention of discouragement, but to indicate research conditions which have been fulfilled in many overseas countries, and which should not be out of reach in Australia. In addition, it should be recognized that research work, especially of the type dealing with the physiological effects of physical activities, is of vital importance to physical education, as no prediction of the results of what we are doing is possible without the facts and guidance provided by physiological and related research. As an example of such predictability I may quote the possibility to appraise an athlete's training by means of his individual blood picture and its changes. Microscopic investigations of the white blood cells of long distance ski-runners (50-kilometre races) have shown very clearly the difference between well-trained and poorly trained subjects. I understand that at present similar research is conducted by the physiology department at the University of Sydney, the results of which seem to confirm our findings with ski-runners.

Generally it may be said that many controversies as to the suitability and the effect of physical activities are nothing but futile attempts to answer questions by means of debates, when scientific research only can provide us with the proper solution.

The same can be said about the next group.

Standard Values, Testing, and Technique of Physical Activities.

In regard to standard values, the demand of the practitioner is most obvious, and standard values are requested for the different age groups, sexes, constitutions (types), races, climates *et cetera*. Standard values are of greatest importance for the introduction of any kind of physical activity to any given group of people, and they become most valuable when competition arrangements are considered. For a long time it has been recognized that age-grouping alone is most unsatisfactory and that it has to be amended by a number of other factors according to the demands made by the activity in question; most of these factors refer to the particular body build of the person participating in the competition. Two arrangements can be employed. The one deals with the modifications of the activity rating and also with modifications of the score awarded to the individual performer. The other arrangement uses index figures correlating in various ways such features as age, weight, height, chest circumference *et cetera*. Often both these arrangements are combined.

Finally it may be pointed out that standard values as related to and modified by individual measurements can play a valuable role in the assessment of individual progress in the modern educational process of letting the individual compete against himself.

For the investigation of standard values and their variation according to individuals or groups, kinesiological data and anthropometrical measurements have to be combined.

It is in the compilation of standard values that the modern science of statistics finds its most thorough application, and full acquaintance with statistical methods is essential if the investigator wants recognition of his results. I may add in this connexion that an elementary course in statistics could well be considered as part of the curriculum in our physical education courses.

In regard to the testing and technique of physical activities, another wide avenue opens into research, of which kinesiology and body mechanics are the main instruments. Beginning with gravitational studies of standing-posture and leading to the cinematographic analysis of the complex movements of athletics or apparatus work, kinesiological research will bring results which may guide the one concerned with postural development of the pre-school child as well as those coaching champion athletes, and also the therapist who has to deal with the reeducation of specific muscle groups through trick movements or the alteration of lever chains. (How little we still know about simple body movements may be recognized by the fact that even now the lever question concerned with heel raising in the standing position is not yet finally answered.) A

new approach to the question of posture in relation to muscle work is made in very many quarters, and the professor of physiology in the University of Melbourne has obtained rather revolutionary results by his method of registering the action currents of antigravity muscles. To touch even upon the field of testing of muscular activities would be impossible in a short paper like this, and I must refer the reader to the rather substantial literature on this subject. (See, for instance, the physical fitness appraisal by Cureton and co-workers, 1947).

Educational Background and Procedures in Physical Education.

Fortified with results of investigations as to the effect of activities upon the organism, and also provided with the knowledge of energy demands made by different activities, the research worker will be anxious to find out how far physical activities can be embodied into the totality of education. Group and individual psychology (including child psychology) are needed to give an insight into emotional reactions and into the possible contributions of physical education to character education. The existing results of educational psychology research as to attention, learning, motivation and transfer, as well as investigations into sensory responses, sensations of positions and movements, sense of rhythm—all these will have to be applied to our special physical education exploration of the field of educational research. Other questions to be asked here are concerned with planning curricula which cater for all, and not only for those interested in special aspects of physical education. Similarly the question of how to approach the reluctant, the anxious and the plainly hostile pupil or student is still to be answered in a definite way.

The integration of physical education in the school curriculum and time-table, the problems of building and other facilities, the arrangements of special classes for convalescents and for constitutional weaklings *et cetera*, all these and many more difficulties cannot be overcome by good will and enthusiasm alone, but need the backing of research which starts with physiologico-medical considerations and leads through psychological to educational investigation.

Correlated Research.

Under the heading of correlated research may be grouped special aspects of our work, in which it is thought that even more than in the previously mentioned branches of research the physical educationist not only needs the assistance of another scientist, but may even play a secondary role, physical education acting as an auxiliary. Three examples of such correlated research may be given.

1. The relationship between physical and mental activities. The science of mental hygiene will be asked, as well as asking, this question, and physical education may be of help in answering it. The physiologist, the psychologist and the educationist will join the team. The result would concern all of them, but should find its final formulations through mental hygiene. Research work of this nature will also lead to close cooperation with and appreciation by the class teacher.

2. Physical education and a given sociological setting. Here the sociologist and the anthropologist will take the lead, and again, physical education in its wider aspects will have to prove its value. Various projects can be named which should be of interest: physical activity provision on playgrounds and in clubs and its influence upon delinquency and other forms of social maladjustment; the sociology of games and team games; play development and its deviation from the normal under different social conditions; the modern community situation as to leisure time possibilities and activities and its effect upon people of different degrees of maturity. There is hardly one of the sociological settings of today in which the physical educationist could not find ample scope as a research worker.

3. Physical education and medicine. As in its practical application, so also in research work, these two subjects show undoubtedly the closest correlation throughout. This

in some quarters goes today so far as to regard physical education as a branch of health education. But even if we repudiate this rather extreme point of view, we have to agree that physical education has to make valuable contributions to health education, and as a subject health education should be included in all physical education courses. Returning to the question of research, we may refer to the need to gain fuller and deeper knowledge of the maintenance of constancy and homeostasis in health and disease through physical activities (Cannon, 1932), and also to the relationship between resistance power of the organism and its lowering or raising through activities; of further interest and importance would be the exploration of the efficiency and compensation level of certain organs and systems under different conditions of strain, tension and relaxation (rhythmical and otherwise). The modern conception of psychosomatic medicine contains many challenges to the physical educationist, and psychosomatic findings are offering themselves readily to tests and further investigations in the physical education laboratory. (The survey of literature on psychosomatic relationships by Flanders Dunbar, 1946, provides stimulating reading in this respect, and so does the classical work by Cannon on "Bodily Changes in Pain, Hunger, Fear and Rage".)

The convalescent and the handicapped have already been mentioned, as also has the usually poor habitual state of health of many people; the need for contact with medical research workers is obvious, if we as physical educationists regard our subject as one dealing with the whole man.

CONCLUSION.

In conclusion, let me say a few words about the basic conditions which are required if we want physical education departments to participate in the research task of our universities. These requirements, mentioned at the beginning of the paper as lacking so far, can be summarized under three headings: time, laboratories, staff.

1. Time. As was stated previously, research demands that kind of leisure which is essential for creative thought—the "creative pause" which is so often mentioned in the realm of artistic production. The time-table of the research worker cannot and should not be overcrowded with the rush of hour-by-hour and day-by-day duties of instruction and lecturing, which makes it impossible to concentrate upon a research problem. Extension of our courses and increase of our full-time staff will be able to give us better time conditions for research.

2. Laboratories. By this word I do not mean only a well-equipped laboratory of our own. The "laboratory" of the physical educationist is more than a couple of rooms; it is the gymnasium, the swimming pool, the athletic and games field—and all this within easy reach—that is, as a unit, a physical education plant. There are many reasons why such a plant is essential for the work of our courses, but certainly physical education research in the true sense of the word is gravely handicapped without the proper facilities. In the meantime, we may do makeshift work through the understanding cooperation of and with research workers from other faculties; our full contribution to the scientific task of universities we can make only if we are given the correct tools for our workmanship.

3. Staff. Tools do not make the workman, and some of the outstanding scientific discoveries have been made under very poor working conditions (radium and insulin, to give only two examples). Certainly such discoveries were made by quite outstanding personalities, with whom we could not compare ourselves. Thus our demand for good working facilities still stands. But our research staff has to be equally good. Research workers have to be of special calibre, they have to be well trained and prepared for their task; they have to be able to see problems in all their ramifications and to discriminate the "essentials"; they have to be unbiased and unprejudiced even if and just when the outcome of the experiment runs contrary to expectation; they must show patience—biological events cannot be hurried—and still they must be active, in the sense of being ever ready in pursuit and observation of the one fleeting moment which may contain the key to the treasure chest of scientific truth. And as it is the search

for truth which characterizes most deeply scientific research, so a deep inner love and longing for truth will be the hall-mark of our research worker.

I have no doubt that, if we look for this picture of a scientist, we shall find its likeness in many of our colleagues, and, given the time and the facilities, valuable research will be done in our departments—research which, in the words of Steinhaus, will give to physical education: (i) Building material of accurate facts and principles for sound practice and wise philosophy. (ii) Ideas to kindle enthusiasm in our professional ranks and a warm reception in the public mind. (iii) Professional personnel that is expert in its attacks on new problems, keenly alert to new opportunities and wisely guided in the efficient applications of its energies and disciplined with a fine humility that is fathered by confidence in one's power and mothered by an appreciation of one's limitations.

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CURARE AND ELECTRO-CONVULSIVE THERAPY: A SIMPLIFIED TECHNIQUE.

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THE value of curare as an adjunct to electro-convulsive therapy is now well established.

When used as a preliminary to electro-convulsive therapy, curare is usually administered in relatively large doses which necessitate controlled respiration. In addition, "Pentothal" or similar barbiturate is given intravenously to cover the unpleasant effects.

Experience shows that smaller doses of curare, which do not involve the muscles of respiration, are adequate for most psychiatric cases, and that these smaller doses are not unpleasant for the patient, and so the preliminary intravenous administration of a barbiturate is unnecessary. With a conscious patient it is possible to demonstrate the degree of curarization, and if this is considered inadequate, the electro-convulsive therapy is withheld until the next day, when the dose of curare is increased.

Technique.

Only female patients have been treated, and the curare used in every case was the natural "Tubarine".

The aim is to find the dose of curare that will prevent the patient from raising the head from the pillow and the extended legs from the bed without appreciably affecting respiration. It is wise to rehearse these movements of raising the head and legs before the injection, to ensure that the patient is cooperative.

On the first day of treatment a small safe dose of curare (say 12 milligrammes) is given intravenously in the usual way, but without preliminary barbiturate. Within one minute the eyelids droop, the jaw sags, there is dysarthria and reluctance to speak, and if asked how she feels, the patient will complain of feeling "heavy", blurred vision and difficulty in swallowing. About two minutes after the injection the patient is unable to lift the head off the pillow when asked to do so, and soon after the extended legs can no longer be raised, and varying degrees of paralysis of the arms (which are more difficult to assess) develop. There should be little or no respiratory involvement.

This state, which develops about four minutes after injection, represents the desirable degree of curarization, and after a delay of about another minute to ensure that there is no respiratory embarrassment, the electro-convulsive therapy is given in the usual way.

The fit which follows is sufficiently "softened" for most cases in which unmodified electro-convulsive therapy would be considered dangerous. The legs and spine remain almost immobile; the face and arms show some spasms, but without any of the violent movements seen in the unmodified seizure. The clonic spasms of the arms, usually so powerful, can be readily overcome with finger-tip pressure. Recovery differs in no way from that seen after ordinary electro-convulsive therapy.

Should this initial dose of curare prove inadequate—that is, should the patient be able to raise the head and legs—no electro-convulsive therapy is given, but the treatment is postponed until the next day, when the dose of curare is increased.

The smallest dose found to produce adequate curarization was 10 milligrammes; the largest necessary was 18 milligrammes. Once the optimum dose has been found, the

patient can usually be relied on to react with a constant pattern of curarization; but on occasions it seems to be necessary to increase the dose slightly from day to day. Only minor degrees of sensitization have been encountered.

The method is considered simple and time-saving, the whole procedure being over in about seven minutes, after which time the patient can be left in the charge of a nurse.

"Prostigmin" and apparatus for instituting controlled respiration should always be at hand, but will seldom be needed.

It is interesting to note that an occasional ampoule of "Tubarine" seems to be quite inactive, although the makers deny the possibility of this.

Patients Treated.

During the last two and a half years 16 patients have been treated by this method, with no cause for anxiety.

During the same period over 700 patients were treated with conventional electro-convulsive therapy, and the small percentage of patients given curare reflects the optimistic attitude taken at this hospital concerning the safety of electro-convulsive therapy, and indicates that curare was used only in cases in which the risk was very real.

Complicating conditions for which curare was used include the following: recent fractures, such as crushed vertebral bodies and Colles's fractures; long-standing central dislocation of the femur; active pulmonary tuberculosis; recent cerebro-vascular accident; recent coronary thrombosis; thyrotoxicosis *et cetera*.

One of the tuberculous patients seems worthy of mention.

She was admitted to the Receiving House from a sanatorium with active pulmonary tuberculosis. She was acutely manic, flung her food and infected sputum at staff and patients alike, and was a hopeless nursing problem. She was given five sessions of electro-convulsive therapy with thirteen milligrammes of curare, and rapidly became a pleasant and cooperative patient. She was returned to her sanatorium, where the superintendent reported that there was no clinical or radiological change in her condition.

Summary.

1. Doses of curare, short of those producing respiratory involvement, are sufficient for most psychiatric purposes.
2. Such doses do not distress the patient, and so the intravenous administration of a barbiturate is unnecessary.
3. A method of giving these smaller doses is described.

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THE DETERMINATION OF SODIUM AND POTASSIUM IN BLOOD SERUM.

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THE levels of the alkali metals sodium and potassium in blood serum have become increasingly important in clinical pathology. The methods of determination of these levels described in standard text-books are cumbersome, and the time taken from collection of the blood sample to the end result is much too long to be practical in an acute crisis.

The levels of the alkali metals can be determined very rapidly by means of a flame-photometer. However, the high price of such an instrument and the high skill required to instal and operate such an instrument, will bring it outside the scope of any but the largest and wealthiest hospital laboratories.

The methods suggested in this paper do not require special apparatus. They require only a centrifuge, electrically driven, capable of about 1500 to 2000 revolutions per minute, and a photo-electric colorimeter. The methods can be carried out by technicians with average biochemical skill.

The methods have been adapted from published methods. To avoid the necessity of looking up and piecing together cross-references, a complete detailed description of the methods is given, even those parts which do not vary from the original recommendation.

The accuracy of the methods is quite sufficient for all clinical purposes, as repeated checks with flame photometer readings have shown. With careful observance of the instructions, the errors should not exceed $\pm 5\%$ of the total result.

SERUM POTASSIUM.

Only during the last fifteen years has it been realized how many lives had been lost from potassium deficiency. Mortality in infantile diarrhoea was reduced from 25% to 5% with potassium replacement therapy. Changes in the potassium metabolism, which frequently led to death, were demonstrated in the recovery phase of diabetic acidosis.

Recently, cases of potassium deficiency, some of which were fatal, have been experienced in the treatment of tuberculosis with PAS (para-aminosalicylic acid), when preparations of PAS were used which contained certain impurities. Other examples of potassium deficiency were encountered after therapy with deoxycortone, testosterone and ACTH.

In intestinal obstruction and in the treatment of surgical conditions after operation, particularly those involving the digestive tract, low potassium serum levels may be encountered, and comparatively large amounts of potassium may have to be replaced orally or intravenously to avoid heart block.

In advanced renal disease, and if too much potassium has been given in replacement therapy, particularly intravenously, heart block may be caused by hyperkalemia (excess of potassium in the blood serum).

This short list of examples, which is by no means complete, indicates the necessity for all biochemical laboratories in larger hospitals to be able to carry out serum potassium determinations with a fair degree of accuracy.

Serum potassium levels from 15.5 to 21 milligrammes per 100 millilitres of serum can be regarded as normal. If the level drops below 15 milligrammes per 100 millilitres a close watch should be kept for a further decline; below 14 milligrammes per 100 millilitres replacement therapy should be commenced without delay.

When the serum potassium level increases above 25 milligrammes per 100, the danger of potassium intoxication may occur, with the danger of cardiac arrest. Peritoneal lavage or the administration of one litre of 40% glucose solution and 30 units of insulin by cardiac catheter has been recommended in extreme cases of potassium intoxication.

The method for the determination of the potassium level in blood serum recommended in this paper follows essentially the excellent method described by Abul-Fadl (1949). However, the time taken for the determination has been considerably cut down, and this is of great importance in many critical conditions like the recovery phase in diabetic coma, when the time factor becomes very important if replacement therapy is to be started in time.

Many other pitfalls of the method, which may lead to wrong results even at the hands of an experienced biochemist, are discussed and eliminated.

Solutions.

Sodium cobaltinitrite solution is prepared as follows.

Cobaltous nitrate crystals, 12.5 grammes, are dissolved in 25 millilitres of water and 6.25 millilitres of glacial acetic acid are added. To this solution 105 millilitres of a solution

of 60 grammes of sodium nitrite in 90 millilitres of water are added. Nitric oxide is evolved. Air is drawn through this solution till no odour of nitrous fumes is perceptible, which takes about two hours.

The reagent is kept in the refrigerator and is filtered before use. It is discarded after about one month.

A 7.5% solution of glycine in water is used. It is preserved with a few drops of chloroform.

The sodium carbonate solution used is a 25% aqueous solution of anhydrous sodium carbonate. If necessary the solution is filtered before use and is kept in an incubator to prevent crystallization of the hydrate.

The phenol reagent of Folin and Ciocalteu is prepared as follows.

In a 1500 millilitre flask dissolve 100 grammes of sodium tungstate (dihydrate) and 25 grammes of sodium molybdate (dihydrate) in 700 millilitres of distilled water. Add 50 millilitres of phosphoric acid (85%) and 100 millilitres of concentrated hydrochloric acid. Reflux for ten hours. Add 150 grammes of lithium sulphate and a few drops of bromine. Boil for fifteen minutes without a condenser to remove excess bromine. Cool and make up to 1000 millilitres. Filter through good quality filter paper. One part of the reagent is diluted with two parts of water for use.

Method.

Amounts of 0.2 millilitre of serum are pipetted into calibrated centrifuge tubes of about 10 millilitres capacity and 0.5 millilitre of sodium cobaltinitrite solution is added to each tube with shaking. The tubes are immediately placed in a beaker containing chilled water at 4° to 5° C. for ten minutes. If results are not urgently required, the tubes may be allowed to stand at room temperature (not exceeding 25° C.) for forty-five minutes. One millilitre of water is added and the tubes are centrifuged for ten minutes at 1500 to 2000 revolutions per minute. (It should be noted that angle centrifuges are not suitable.)

After careful decantation about two minutes are allowed for draining. The end of the centrifuge tube is wiped with filter paper, while the tube is in an inverted position. Two millilitres of distilled water are added, the walls of the tube being rinsed. After five minutes' centrifuging, the tubes are decanted and drained as before.

Five millilitres of alcohol (60% volume for volume) are run into the tubes. Glass rods, about 1.0 to 1.5 millimetres in diameter, are used to break up the precipitate, which cannot be suspended in the wash liquor in any other way. After the tubes have been spun and drained as before, two millilitres of water are added to each tube and the stirring rods are replaced into the correct tubes.

The tubes are placed in boiling water for about five minutes. To each tube, while still hot, are added one millilitre of 25% sodium carbonate solution and one millilitre of 7.5% glycine solution (on no account must the order be reversed). The stirring rod is then wiped and withdrawn. A tube containing two millilitres of hot distilled water is treated the same way, to be used as a blank. The content of each tube is poured into an empty centrifuge tube to mix the solutions. One millilitre of the phenol reagent is added and the solution is poured back into the original tube. The volume is made up to the six millilitre mark with distilled water. After the solution has been poured forth and back into the original tube again, the tubes are put, for ten minutes, into a beaker containing water at 40° C. In the meantime the photoelectric colorimeter or spectrophotometer is prepared for use. A red filter is used on the colorimeter and a wave-length of 700mμ on the spectrophotometer. The tests are read against the blank set on zero.

The results are read off a curve prepared by comparing serum of known potassium content or solutions of known potassium concentration.

Important Points.

The following points have to be observed very strictly if correct results are to be obtained.

Taking of Blood Samples.

Only serum may be used. Citrated, oxalated or heparinized plasma samples are unsuitable. Bulky precipitates will form on precipitation with sodium cobaltinitrite reagent, which cannot be washed free of excess reagent. As the colour obtained in the colorimetric comparison is proportional to the amount of cobalt precipitated, the results obtained are much too high.

If the results are to be obtained in the shortest possible time, the syringe must not be lubricated, and between five and ten millilitres of blood should be collected. Under those conditions five to ten minutes' spinning about five minutes after the blood has been taken will usually yield enough clear serum for a duplicate determination.

The syringes and needles must be absolutely dry and the blood must not be squeezed through the needle, otherwise haemolysis will occur and the results will be much too high. The needle must be removed and the blood run into the centrifuge tube under slightest possible pressure.

Standard Calibration Curve.

Abul-Fadi (1949) used an aqueous solution of potassium sulphate containing 20 milligrammes per 100 millilitres as a standard, and used 0.2 millilitre of this solution for a parallel standard with each series of determinations. It was found that it is more difficult to obtain reproducible results from pure aqueous solutions of a potassium salt than to determine the potassium content of a blood serum sample. The cobaltinitrite precipitate from a pure potassium salt solution consists of very fine crystals, which after centrifugation have a strong tendency to be resuspended partly into the solution with slight movements. A little precipitate can therefore easily be lost in the process of decantation of the supernatant liquor. This often causes low results.

It was found that, as long as the test solutions were not exposed to temperatures above 25° C., the results obtained were sufficiently constant for all practical purposes. A curve can be plotted and the results read off from the colour intensity. The calibration curve may be made up from a large number of extremely accurate determinations of pure potassium solutions, at least four determinations being made on three concentrations containing 10, 15 and 20 milligrammes per 100 millilitres respectively. Decantation has to be carried out with extreme care.

If a flame photometer can be made available at a nearby institution, it is still better to determine the concentration in two or three specimens of serum, use the same specimens for the chemical test and plot the curve according to the results of the flame photometer. However, great care has to be taken that fresh serum is used for both tests. If serum is exposed to room temperature for several hours, the results obtained by the chemical method tend to be about two milligrammes per 100 millilitres too high. This increase seems to be due to some changes in the protein fraction, a slight amount of which coprecipitates with the cobaltinitrite reagent and absorbs excess cobalt reagent. If the serum is kept at a temperature below 5° C. for not longer than twenty-four hours, correct results will be obtained. Certain precautions have to be observed to prevent the tubes from becoming warm (above 25° C.) during the test. On very hot days the centrifuge tubes must be kept in cold water during the standing period, even if they are allowed to stand longer. The wash liquors, too, are cooled down to about 10° C. or less. The centrifuge must not warm up during spinning; this often cannot be achieved unless the lid is removed during spinning.

Centrifuge Tubes.

It is a good idea to have special centrifuge tubes put aside for the test. It is most important that the tubes be extremely clean. Standing in a closed jar filled with sodium bichromate and concentrated sulphuric acid mixture for several hours, followed by thorough rinsing first in tap water then in distilled water, gives excellent results. Much time is saved if the tubes are graduated with permanent glass marking ink at volumes of 1.7, 2.0, 5.0 and 6.0 millilitres. The wash liquors can then be delivered from separating funnels, the tips of which have been drawn to a point, to the mark required. Permanent numbering of the tubes avoids the risk of temporary markings rubbing off during handling.

Precipitation Time.

There is no difference in the results, whether the tubes, after precipitation with sodium cobaltinitrite reagent, are allowed to stand in iced water for ten minutes or at room temperature (not exceeding 25° C.) for forty-five minutes. However, under no circumstances must the time of forty-five minutes be exceeded, otherwise flocculent material will coprecipitate and the results will be much too high.

SERUM SODIUM.

While the potassium level in the blood serum may vary in pathological conditions over an extremely wide range (five to forty milligrammes per 100 millilitres), the variations of the serum sodium levels are much smaller. Only seldom are levels under 280 milligrammes per 100 millilitres observed, and rarely is a level of 400 milligrammes per 100 millilitres exceeded.

While serum potassium affects the heart muscle, there does not seem to be a direct effect of serum sodium on any vital organ, and variations of the sodium level from the normal do not seem to endanger life to the same extent as variations of the serum potassium level.

Reagents.

Zinc uranyl acetate solution is prepared as follows.

A boiling solution of 10 grammes of uranyl acetate and two millilitres of glacial acetic acid in 50 millilitres of water is added to a boiling solution of 30 grammes of zinc acetate and one millilitre of glacial acetic acid in 50 millilitres of water. After the mixture has stood overnight at room temperature, add an equal amount of alcohol (95%). After having stood for forty-eight hours at 5° C., the solution is filtered.

Trichloroacetic acid solution, 20% weight for volume (sodium standard), is prepared in the following way. Oven-dried sodium chloride, 0.2224 gramme, is dissolved in distilled water and made up to exactly 100 millilitres of solution.

Method.

The method is essentially the method used by Albanese and Lein (1948). The standing time for the precipitated sodium zinc uranyl acetate has been considerably reduced, and thin glass rods are used to resuspend the precipitate for the washing operations.

Blood serum (0.2 to 0.5 millilitre) is treated with three times the volume of trichloroacetic acid solution. After centrifugation 0.4 millilitre of the supernatant liquor (equivalent to 0.1 millilitre of serum) is treated with one millilitre of zinc uranyl acetate reagent in centrifuge tubes, carrying permanent marks at the two and five millilitre levels. (Tubes used for the potassium determination may be used.) Stirring rods, about 1.0 to 1.5 millimetres in thickness, are used to mix the solution. If the tubes are shaken, some precipitate will adhere to the higher parts of the centrifuge tubes, and the danger of losing precipitate, when the supernatant liquor is decanted, is much increased.

After having stood for ten to fifteen minutes in a bath of chilled water (4° to 5° C.), the tubes are centrifuged for five minutes at 1500 to 2000 revolutions per minute. The centrifuge must not be or become warm. The lid must be left off, if necessary.

After two minutes' drainage, the mouth of the tube is wiped with filter paper. Two millilitres of alcohol (95%) are run down the side of the tube, and the glass rods (in correct order) are used to resuspend the precipitate. After centrifugation for five minutes and drainage as before, the precipitate is dissolved in five millilitres of distilled water. The stirring rods are used to dissolve the precipitate before the contents are mixed by inversion. If the solution is not brilliantly clear, it may be centrifuged for a few minutes. The yellow colour of the solution is measured immediately in a photoelectric colorimeter by means of a green filter, or a spectrophotometer may be used at a wave-length of 420 mμ.

An amount of 0.4 millilitre of the standard sodium chloride solution (containing sodium equivalent to a concentration of 350 milligrammes per 100 millilitres of serum) is treated in the same way as the trichloroacetic acid liquor of the test solutions, and is used as a standard.

$$\text{Sodium (unknown)} = \frac{\text{colour intensity unknown} \times 350}{\text{colour intensity of standard}}$$

As there is a slight variation in the colour intensity of the standard from day to day, probably due to some temperature fluctuations, a standard is prepared with every series of determinations.

SUMMARY.

Detailed methods have been described for the clinical determinations of the alkali metals sodium and potassium, which are reliable and quick and do not require special apparatus and skill. If the tests are run in parallel, one operator can carry out up to twenty-four determinations in one working day.

ACKNOWLEDGEMENTS.

I wish to thank Dr. R. B. Maynard for his interest and assistance in this work, and the chairman of the Repatriation Commission for permission to publish this paper.

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Reports of Cases.

PANCREATITIS COMPLICATED BY PSEUDOCYST: REPORT OF A CASE OF A PATIENT DYING IN DIABETIC COMA.

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Sydney.)

THIS is the report of a patient who, suffering from progressively deteriorating pancreatitis, developed a pseudocyst. This was drained, but a severe disturbance of carbohydrate metabolism due to destruction of the islet cells then ensued, and death occurred with the patient in diabetic coma.

Pseudocysts are not common. There were only nine in the Lahey Clinic from 1926 to 1945 (Adams and Nishijima, 1945). At the Royal North Shore Hospital of Sydney from 1925 to 1950 there were 89 cases of pancreatitis (69 acute and 20 chronic); these have been described elsewhere (Rose, 1951) and shown to be but variations of the one disease process of pancreatitis. Four of the patients in these 89 cases developed pseudocysts, four developed diabetes mellitus, and one (the patient in the case here reported) developed both a pseudocyst and diabetes mellitus.

Description of the Cases in which the Patient Developed a Pseudocyst.

Case I.

A patient's cyst ruptured spontaneously into the peritoneal cavity, recovery ensuing after simple drainage of the cyst. The patient has remained in good health during the following three years, and the cyst has not recurred (Rose, 1948).

Case II.

A patient had acute hæmorrhagic pancreatitis (pancreatic necrosis) and was treated by laparotomy only. Three months later, cholecystectomy was performed for cholelithiasis. The pancreas at that time appeared normal. However, two years later a pancreatic pseudocyst developed. This was drained externally with a good result. The sinus healed in two months.

Case III.

A patient had a pancreatic pseudocyst drained externally. The fistula healed quickly, but chronic pancreatitis ensued; the diagnosis was proved by biopsy at laparotomy ten years later. There was then no evidence of the cyst at all.

Case IV.

A patient developed acute hæmorrhagic pancreatitis for which drainage only was carried out. A large cystic epigastric mass developed, which slowly subsided over the next two months.

Case V.

The fifth patient is the subject of this report.

Clinical Record.

The patient, a man, aged fifty-four years, complained that since 1941 he had had attacks of vomiting and belching for which no cause had ever been found. In 1949 X-ray examination after a barium meal showed "duodenal irritability". He was treated with an alkaline mixture, which relieved his symptoms until November, 1950, when he first noticed attacks of epigastric pain occurring every two to three days. The pain had no relation to meals and would last for hours at a time. Occasionally it was relieved by the taking of food or alkali, but it was accentuated by vomiting or straining.

On December 17, 1950, the pain was severe and lasted all day. He was then free of pain until December 20, the day of his admission to the Royal North Shore Hospital of Sydney, when the pain recurred severely after he had been straining at stool.

There were no symptoms referable to other systems, save that he was always constipated and had lost 39 pounds' weight in the past three years. There was no previous history of illness or injury. He was married with two children. He was a teetotaler and a light smoker only.

Examination of the patient on admission to hospital disclosed an ill-looking, rather wasted man with a temperature of 99.4° F., a respiratory rate of 22 per minute, a pulse rate of 80 per minute and a blood pressure of 200 millimetres of mercury, systolic, and 120 millimetres, diastolic. His tongue was furred. There was tenderness in the epigastrium with slight rigidity. There was sugar in the urine, as shown by its orange colour when tested with Benedict's solution. (This never occurred again in hospital and the significance of this positive test result was overlooked, so that a blood sugar curve was never prepared; nor, by some oversight, was a urinary diastase estimation carried out.)

Three days later (December 23) the patient had more pain, and a rounded mass was found in the epigastrium. It was fixed, tender and resonant to percussion. The temperature now commenced to swing from 98.4° F. to 102° F., and the patient looked ill. A white cell count showed a total of 14,100 leucocytes per cubic millimetre, of which 75% were neutrophile cells.

On January 2, 1951, X-ray examination after a barium meal revealed that the stomach was pushed forwards and to the left by a rounded mass. (Figure I shows an antero-posterior view, and Figure II shows a lateral view of the barium-filled stomach.)

The mass became daily larger and more tense, so that on January 6 operation was performed and a large pancreatic pseudocyst was found filling the lesser sac. It

contained 28 ounces of brown fluid, which was later shown to contain altered blood, diastase and lipase, and to be sterile on culture. The liver, gall-bladder and common bile duct appeared normal. The pancreas, which formed the posterior wall of the cyst, was firm, but seemed to be otherwise normal. The walls of the cyst were formed by the surrounding viscera (pancreas, stomach, liver and spleen), covered by a thin endothelial-looking layer. On this account the cyst was able to be treated only by simple drainage to the exterior.



FIGURE I.

Convalescence was complicated by a series of attacks of pain, high temperature, vomiting and steatorrhœa. The total proportion of faecal fat was 32.8%, and 20% only of this was split. The urinary diastase value was ten units and the serum amylase value eight units (Wohlegemuth); these are normal figures. The attacks lessened in intensity and finally disappeared, so that the patient was able to be discharged from hospital to his home with the sinus almost healed on February 10. He was 14 pounds heavier than he had been on admission to hospital.

He was readmitted to hospital on April 14, deeply comatose and dehydrated. His blood sugar content was 520 milligrammes per centum, and he died a few hours later in spite of insulin and supportive therapy. His wife stated that he had refused to attend the follow-up clinic or his own doctor as he was very well except for a slight intermittent discharge from the sinus. However, a week before his death he had started to complain of thirst, tiredness and loss of appetite. This had become worse, and he had become comatose with deep sighing respirations shortly before his admission to hospital.

Autopsy disclosed a small, thick-walled cystic cavity in the lesser sac still connected by a small sinus to the

skin. It was full of semisolid greenish material. The lining of the cyst was formed of granulation tissue.

The pancreas was hard and fibrous in texture. It was depressed anteriorly from the pressure of the remainder of the cyst. There was no obvious connexion between the pancreatic duct and the cyst lumen. The main pancreatic duct joined the common bile duct proximal to the ampulla of Vater, and the pancreatic duct contained a little bile. (Incidentally, only 20% of 200 cases of pancreatitis had this anatomical finding—Mann and Giordani, 1923.) The



FIGURE II.

liver, gall-bladder and extrahepatic ducts were normal macroscopically. There were no biliary calculi. Microscopic examination of the pancreatic parenchyma showed necrosis in addition to fibrosis. No islet cells were seen. The liver sections were normal. The gall-bladder wall was sectioned, and examination showed *cholecystitis glandularis cystica*.

Discussion.

It is interesting to speculate on the ætiology of these cysts, which are due to pancreatitis. There appears to be an escape of pancreatic fluid due to necrosis of the gland and capsule allowing direct communication between the pancreatic duct system and surrounding areas especially the lesser sac. Once the lesser sac is involved, the foramen of Winslow becomes sealed, and so a pseudocyst commences. This may become absorbed, as in Case IV, though this is uncommon. On the other hand, it may gradually become larger from the escape of more pancreatic fluid, or it may suddenly increase in size from hæmorrhage, which may even cause it to rupture as in Case I. These cysts are always sterile, and if infection does occur following pancreatitis, peripancreatic abscesses form, again usually in the lesser sac. These collections should be regarded simply as abscesses and not as a variety of pseudocyst.

In all these cases (except Case IV) treatment was by simple drainage. In each case the walls were merely a thin endothelium-like lining of the surrounding viscera, so that the cyst could not be mobilized to be marsupialized; nor could anastomosis be performed with the alimentary canal.

However, simple external drainage is an efficient method of treatment, as may be seen in the cases here reported (Pinkham, 1945); in Cases I, II and III healing occurred quickly, and in Case V healing had almost occurred before death ensued four months after drainage.

Cases II, III and V illustrate the progressive march of events of pancreatitis as the pancreatic cells deteriorate. In Case V this also affected the islet cells, so that death with the patient in diabetic coma followed. Schumaker (1940) has shown that *diabetes mellitus* is a lethal complication of pancreatitis, and this case was no exception.

Summary.

A case of chronic pancreatitis which was complicated by a pseudocyst is described. The disease was progressive and the patient died in diabetic coma four months after the pseudocyst was drained. Four other cases of pseudocyst which occurred at the Royal North Shore Hospital of Sydney from 1925 to 1950 are also briefly described.

Acknowledgements.

I wish to thank Dr. W. Freeborn, the general medical Sydney, for permission to use the records of these patients.

I also wish to thank Dr. F. Rosati, of Narrabeen, for information concerning this patient prior to his admission to hospital.

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Reviews.

PHYSIOLOGICAL CHEMISTRY.

In any borderline field of study where important points of view are subject to modification by current research a concise review can be very valuable if conciseness is not obtained at the expense of accuracy. Dr. H. A. Harper, of the University of California School of Medicine, has prepared a review of physiological chemistry for physicians and medical students.¹ This book is free from the usual faults of "cram" books and "survey notes". It is a good review of the accepted facts and concepts of the subjects.

Within 250 pages, loosely bound by plastic clips, a large amount of material has been economically printed. Space has been found for a judicious selection of useful charts, tables and illustrations, all separately indexed. The general format is unusual, but agreeably so. The chapter headings are those expected in a standard text, together with a useful chapter on the functions and tests of the liver. The chapters dealing with tissue fluids and electrolyte balance are better

¹ "Review of Physiological Chemistry", by Harold A. Harper, Ph.D.; Third Edition; 1951. Palo Alto, California: University Medical Publishers. 10½" x 7", pp. 268, with 13 figures. Price: \$3.50.

than usual. In general the schemes and diagrams are very well put together and remarkably free of ambiguities and misleading simplifications. This review can be recommended confidently to physicians and to candidates for both undergraduate and post-graduate examinations.

THE AMINO ACID COMPOSITION OF PROTEINS AND FOODS.

In the second edition of "The Amino Acid Composition of Proteins and Foods" Block and Bolling have considerably increased the information on analytical methods for estimating individual amino acids and also the data on the amino acid composition of separated proteins and of foodstuffs.¹ The book gives as complete an account of all the analytical methods the authors have found useful as one could wish for with useful critical comments on the various methods. Adequate details are given of modern methods for isolating and estimating individual amino acids including microbiological, chromatographic and isotope dilution methods. There are many tables collating all the available data on the amino acid contents of different separated proteins and of foodstuffs. The book is such a mine of information on all things concerning the composition of proteins that it is impossible to pick out special points. It is, of course, purely a reference book, but is indispensable for anyone working on the chemistry of proteins. The data given on the amino acid content of proteins and foodstuffs will be very useful in more refined nutritional investigations.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue]

"Browsing Among Words of Science", by Theodore H. Savory, M.A., F.Z.S.; 1951. London: C. A. Watts and Company, Limited. 7½" x 5", pp. 94. Price: 1s.

Words are discussed under headings of ten different sciences.

"The Glands Inside Us: Their Effect on Our Lives", by John Ebling; 1951. London: C. A. Watts and Company, Limited. 7½" x 5", pp. 94, with nine text figures. Price: 1s.

Intended for the public, about hormones and "to some extent about the people who study them and the way they do it". The author is a lecturer in zoology.

"The Nature of Disease Institute: Third Annual Report", by J. E. R. McDonagh, F.R.C.S., edited by Mark Clement; 1951. London: William Heinemann (Medical Books), Limited. 9" x 5½", pp. 510, with 13 text figures. Price: 21s.

The Nature of Disease Institute is an "independent organization" with its own personnel of laboratory workers, osteopaths and trained nurses; it was founded by J. E. R. McDonagh in 1929.

"The 1951 Year Book of Medicine (May, 1950-May, 1951)", edited by Paul B. Beeson, M.D., et alii; 1951. Chicago: The Year Book Publishers, Incorporated. 8" x 5½", pp. 696, with 149 illustrations. Price: \$5.00.

One of the Practical Medicine Series of year books.

"Industrial Medicine on the Plutonium Project: Survey and Collected Papers", edited by Robert S. Stone, M.D.; First Edition; 1951. New York: McGraw-Hill Book Company, Incorporated. 9" x 6½", pp. 536, with 32 illustrations and many text figures.

One of a series of volumes prepared as a record of the research work done under the Manhattan Project and the Atomic Energy Commission.

¹ "The Amino Acid Composition of Proteins and Foods: Analytical Methods and Results", by Richard J. Block, Ph.D., and Diana Bolling, B.S.; Second Edition; 1951. Springfield, Illinois: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 10" x 6½", pp. 614, with eight illustrations, 31 charts and six diagrams. Price: 75s. 6d.

The Medical Journal of Australia

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All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

CROCODILE TEARS AND CHRISTMAS.

SOMETHING more than eighty years after the first Christmas Day, Pliny the Elder dedicated to the Emperor Titus his *Historia naturalis*. Included in this remarkable encyclopædia, which ranges in its diverse contents from the factual to the fantastic, is the story that the crocodile, having eaten its victim's body, weeps over the head before consuming it too. This is said to be the earliest known reference to the legend in literature. Perhaps its most notable subsequent appearance is in "The Travels of Sir John Mandeville", a fourteenth-century account of world travel, for long accepted as the authentic work of the traveller Mandeville. It is now known to have been written by a French physician, Jean de Bourgogne, who had never been to many of the places described and romanced freely and without shame. It is not surprising that the book repeats the story of the lachrymose crocodile and his bogus pity. Others, including Spenser and Shakespeare, allude to it, and the metaphorical phrase "crocodile tears" has passed into common usage. More than that, it has attached itself to a neurological syndrome, on which learned treatises have been written, the most recent by a Polish neurosurgeon, Jerzy Chorobski.¹ The syndrome of crocodile tears consists essentially in unilateral lachrymation accompanying the taking of certain foods—hot soup in the case reported by Chorobski. In most cases the facial nerve is paralysed (though not always anatomically interrupted) on the same side as the lachrymation, and spontaneous weeping does not occur on emotional stimulation. We need not follow now the details of the syndrome, as they are recorded in the literature, or its disputed neurological mechanism. The usually accepted hypothesis is that some of the collaterals of regenerating axons of salivary nerve fibres are misdirected, with resultant innervation of both the salivary and the lachrymal glands. Chorobski offers a new theory based on the concept of cross-stimulation, which, he states, has been shown to occur between various fibre components of a nerve at the site of its injury. For present purposes, however, it is

enough to note that, by a misdirection of nervous impulses, genuine sorrow fails to elicit weeping; yet under the stimulus of food the affected person weeps sorrowless tears and cannot stop them. Crocodile tears flow unbidden: a counterfeit is counterfeited.

This curious paradox has a counterpart in metaphorical crocodile tears, for these are not always consciously hypocritical. Both observer and weeper can be deceived about the true worth of tears. It is often impossible to assess another's sorrow or joy or pity, and it can be difficult to assess one's own. Human motives elude capture. Philosophers of all ages have sharpened their wits on the definition of altruism and selfishness, and in practical living they may defy separation. The cynic readily finds ulterior motives in all good works; just as readily we can dress our selfishness in a glittering cloak of high purpose that deceives even ourselves. Some order is brought into the confusion over the altruism riddle by J. A. Hadfield, in his well-known book "Psychology and Morals". In a discussion on the motives of conduct Hadfield differentiates between primary or initial motive and end motive. The primary motive forces us to action; the end motive arouses the primary motive and determines the direction of the action. The good of one's fellows may be an end motive that has self-display or a craving for approval as the primary motive. Hadfield drily points out that the distinction was clearly recognized by the small girl who bit her brother's nose. Her mother reproved her and suggested that it must have been the devil who put such an idea into her mind. "No", replied the child, "the devil made me angry, but biting his nose was entirely my own idea." Hadfield goes on:

Behind every action we perform lies an instinctive impulse which finds gratification in its expression. When that impulse is accepted by the self and directed towards an end satisfying to the self, it becomes a motive. We recognize both elements in the definition. "The motive is a desire directed towards an end approved by the self."

It is necessary to recognize both elements in our actions. There is no need to be ashamed of the gratification of instinctive emotion as a primary motive; it is the end motive that determines the quality of an act, whether it is selfish or altruistic. The finding of pleasure in an act does not make the act selfish; indeed, Hadfield describes altruism as "finding joy in doing things for others". On the other hand, "for an action to be unselfish or altruistic it is not sufficient that it be for the good of others; it must be consciously directed towards the service of others". Especially must altruism be distinguished from the principle of "enlightened self-interest", the idea that "I shall best serve my own interest by being moral and kind". The old pronouncement that "honesty is the best policy" comes perilously close to being an immoral statement. Certainly, a carefully cultivated attitude of sympathy that is used ultimately to serve one's own selfish ends must come into the despised class of crocodile tears.

This point brings the discussion right into our own professional sphere and immediately raises the question of the "bedside manner". There is no doubt that an approach to the patient that inspires confidence, carefully cultivated though it may be, is a powerful therapeutic factor and, as such, may not be despised; but used as a cloak for ignorance or indifference to the patient's true welfare, it cannot be condemned too strongly. Most of us are not given to introspection on such matters, and indeed we have

¹ A.M.A. Archives of Neurology and Psychiatry, March, 1951.

no need to broach them—others will do it for us. Who has not squirmed at the nauseating rhapsodies sometimes poured forth in tribute to the practitioners of the healing art, or contrariwise rebelled at ugly half-truths like Bernard Shaw's comment, "Of all the anti-social vested interests the worst is the vested interest in ill-health"? Yet for the most part the attitude of the laity conforms to a familiar pattern: grave mistrust of the organized profession combined with sincere confidence in the individual practitioner—each a challenge to altruism in its own way. Far from rare is the attitude revealed in the incident related to the American College of Physicians by Sir John Parkinson:¹ a coster in East London, begging him for relief from his trouble, suddenly interposed: "You're my friend if you're a doctor, aren't you?" In the wider field of the profession as a body, drastic criticism is sometimes made. A senior teacher in one of our medical schools declared recently that the profession was not interested in the school except as a means to an end; most students, in his view, were put to medicine so that they might have an assured income, a large motor-car and a satisfactory position in life. Another perennial target is the hospital honorary system, which is depicted as a thin noble disguise for self-advertisement and the gaining of experience at the expense of the poor. Likewise the profession's attitude on all aspects of national health comes in for bitter attacks from many quarters. And so on. We should be false to ourselves if we denied the element of truth in these accusations; but we should also be false to all that we have held highest since the days of Hippocrates if we belittled the reality of altruism in professional life and practice, or allowed that selfish motives were other than usurpers in our individual or collective thinking. Medicine belongs essentially to the world of pity and of love, in the strongest sense of that much mauled word, just as it belongs to the world of integrity and of truth. There is no place in it for "enlightened self-interest". Nor is there any place for cheap sentimentality. The *æquanimitas* so beloved of Osler is always, in his words, "the desirable attitude"; but with it goes "an infinite patience and an ever-tender charity". Members of the medical profession have always the task of illustrating in their lives "the Hippocratic standards of Learning, of Sagacity, of Humanity and of Probity". There is no place in medicine for crocodile tears.

It is good to think about these things at Christmas, for this season is, as Scrooge's nephew put it, "apart from the veneration due to its sacred name and origin, . . . a good time: a kind, forgiving, charitable, pleasant time: the only time . . . in the long calendar of the year, when men and women seem by one consent to open their shut-up hearts freely, and to think of people below them as if they really were fellow passengers to the grave, and not another race of creatures bound on other journeys".

"Bah! Humbug!", says Scrooge, speaking for all his kind, "if I could work my will, every idiot who goes about with Merry Christmas on his lips, should be boiled with his own pudding, and buried with a stake of holly through his heart." And the Gabriel Grubbs, bitter at the sound of Christmas merriment and the sight of children's play, smile grimly and clutch the handle of their grave-digging spades with a firmer grasp, as they think "of measles,

scarlet fever, thrush, whooping cough, and a good many other sources of consolation beside". But the Scrooges and the Gabriel Grubbs and the rest of the ill-omened crew have no power against Christmas "with all his bluff and hearty honesty". If we ask the source from which Christmas finds its strength, we must acknowledge it in "its sacred name and origin". Christmas celebrates the birth of the Christ; and this, to the Christian, means the mystery of the incarnation. To various of our readers this idea will be fact, symbol, myth or fabrication, and this is not the place to consider which is right. But embodied in the concept are values that we all prize: humility, service and purposeful suffering that are, by definition, infinite and are undertaken with that joy which stands high in the qualities making up true altruism. This is the spirit of Christmas. Well it is for us if, as the New Year treads hard on the heels of Christmas, we say with the repentant Scrooge: "I will honour Christmas in my heart, and try to keep it all the year."

Current Comment.

THE HUMAN FACTOR IN WASHING-UP METHODS.

THIS may be the age of machines, but man has not yet succeeded in making all his machines man-proof. Human fallibility can upset the best-planned mechanical systems. A simple but important example of the fact can be found in the operation of washing-up machines. Results of a British investigation of washing-up methods, referred to in these columns on June 24, 1950, illustrated strikingly the variety of factors involved and the way in which one faulty factor can nullify the effect of care and equipment that are otherwise satisfactory. An important and potentially ever-present fallacy lies in undue reliance on mechanical methods. The purchasing of a washing-up machine does not solve for ever the problem of hygienic dish-washing. The technique of operating it must be carefully learnt and adhered to, or danger may creep in unawares. This is brought out forcibly by Robert M. Cain¹ in the results of an investigation of dish-washing procedures in students' dining halls at McGill University, Montreal. Cain quotes from other published papers examples of carelessness due to improper training in the use of mechanical dish-washing equipment, but points out that there appear to have been no direct bacteriological plate counts made to prove the fallacy of such practices. He has made it his business to remedy this lack of proof. In the four dining halls investigated mechanical dish-washing appliances were in use, the regular operators having had long experience, and under normal conditions bacteriological plate counts from articles washed were satisfactory. Striking increase in counts resulted from carelessness, over-confidence and undue rush. The most important primary factor was insufficient training on the part of the operator, as when an inexperienced person was relieving, but even experienced people sometimes failed under rushed conditions. There would be little point in quoting details of faults committed, as they refer to the particular requirements of the equipment used, but certain of the examples given illustrate not only the breakdown of efficiency that results from human failure, but also the relative efficiency of the mechanical equipment when the fault has been remedied. One interesting incident of a different type was observed in the process of washing glasses. A notable fall in plate counts was thought to be the result of the staff's consciousness of being under observation, so the (untrue) statement was issued that the counts were unsatisfactory and it was recommended that the glasses undergo preliminary soaking

¹ *Annals of Internal Medicine*, August, 1951.

¹ *Canadian Journal of Public Health*, June, 1951.

in what Cain describes as javel water (presumably the hypochlorite solution also known as Javelle solution). It was explained to the staff that the chlorine in the javel water would aid in killing the bacteria on the glass rims. With the change the plate counts immediately rose (as the investigators had cunningly expected), and it was found that the preliminary soaking was being carried out thoroughly, but the subsequent washing was skimmed. Discontinuance of the preliminary soaking was followed by a fall of the counts to acceptable limits. This is a nice example of what is considered to be the effect of over-confidence in equipment with resultant slackening of duty. These faulty results can, of course, be produced by any operator under certain conditions, but particular attention may well be paid to Cain's broad conclusion—namely, that as long as there is improper training of personnel responsible for cleansing eating utensils used in dining halls, the resulting lack of knowledge on the part of the operator will serve to defeat the purpose of the mechanical or manual equipment. A well-trained operator can obtain good results from average equipment, whereas the poorly trained operator can expect nothing but poor results from the same or better equipment.

CROSS-INFECTION IN HOSPITALS.

IN 1939 the Preventive Medicine Committee of the Medical Research Council of the Privy Council appointed a Subcommittee on Cross-Infection in Hospital Wards. This subcommittee prepared a special report on the control of cross-infection, but found that many of the proposed recommendations were impracticable under war conditions. Accordingly a War Memorandum (number 11) was prepared instead, in the hope that despite difficulties some attempt would be made to reduce the incidence of infections contracted unnecessarily in hospital. This memorandum appeared in 1944. Subsequently the subcommittee was reconstituted as the Committee on Cross-Infection in Hospitals. The new committee has revised the original memorandum, which has now been reissued, the main changes relating to points of practical detail and the amplification of certain specific procedures.¹ The memorandum is essentially one of detail, and cannot well be summarized. We may, however, indicate the ground that it covers and some of the main recommendations. The first section deals with the prevalence and consequences of cross-infection, covering in turn respiratory, gastro-intestinal, wound, and skin and mucous membrane infection. In the second section the sources of infection in the hospital are listed, and the modes of infection—contact and mediate, droplet-borne and dust-borne—are discussed. The other two sections are concerned with the prevention and control of cross-infection and the procedure to be followed after the occurrence of infection in a ward. Appendices provide details on disinfection and sterilization, rules for isolation nursing in a cell or open ward, special precautions for maternity units, rules for a ward dressing team, application of dust-allaying oils to floors, blankets and linen, and a course of practical bacteriology for nurses.

The memorandum deals mainly with children's wards in general hospitals and hospitals for infectious diseases, the committee pointing out that cross-infection is most apparent and most dangerous amongst infants and juvenile patients. However, the memorandum goes on, although adults have acquired relative immunity to the common infections of childhood, they are none the less vulnerable to certain pyogenic and other microorganisms, and many of the infections of wounds, burns and the placental site are contracted in hospital. The principles of the spread of cross-infection and the measures advocated for their control in the memorandum therefore apply to all hospital

wards. The risks are greatest in wards for the treatment of infectious diseases and of ear, nose and throat conditions, where sources of cross-infection are inevitably present; but precautions must be taken in every ward, not excepting those containing "clean" cases (for example, maternity and non-infected surgical patients). The committee has apparently been faced with some of the problems that made the original subcommittee restrict their recommendations, for they point out that although factors of obvious importance are proper buildings and sufficient equipment, alterations and improvements in these respects may in many instances have to wait until labour and material are available. It is stated that, given good ventilation and bed spacing, the control of cross-infection turns largely on three things: adequate isolation accommodation, adequate sterilization and disinfection of equipment, and sufficient trained staff to maintain a meticulously careful technique. Serious deficiencies in one or more of these essentials exist in many hospitals, but the committee believes that conditions could be improved. For example, it points out that the best use should be made of all trained staff, and that they should not waste on unskilled tasks effort better spent on acquiring and practising good technique. Further, it is emphasized that bad tools may be an excuse for bad work, and much valuable time is lost on account of insufficient and inefficient equipment. It is important that deficiencies should be recognized. When replacements cannot be procured, necessity may beget invention, and much can be done by improvisation with the help of hospital engineers and carpenters. An important point is made in the statement that every hospital should have a clear idea of its working procedure in the control of cross-infection, but this is not a matter for which any universal scheme will suffice. The scheme will depend upon numerous local conditions—for example, the design and scope of work of the hospital, and the question of whether it is a short-stay or a long-stay hospital. It is suggested that such a scheme might well be prepared by a committee representing doctors, nurses, laboratory workers and administrators (for cross-infection affects the work of all), and it should be the basis for standing orders which all hospital staff should be required to know and obey. The committee might also make plans for the detection and investigation of outbreaks, and for arranging courses of instruction for the staff. It has been found that in hospitals where such courses have been given, the nurses have shown much interest in them. They have welcomed particularly the laboratory demonstrations and practical classes, because these have given them an explanation and understanding of practices that they had previously learnt only by rule of thumb. Detailed suggestions for a course in practical bacteriology for nurses are provided in an appendix, and the reasonable suggestion is made that the present memorandum may well serve as a guide for the instruction of nurses and students.

A "down-to-earth" note appears in the introduction to the memorandum, and medical staffs may well find the remarks made useful in stirring up practical action. The reminder is given, for the benefit of hospital committees and administrators, that cross-infection is a steady drain on the hospital purse and efficiency. Overhead expenses continue and admissions are delayed while wards are in quarantine. Individual patients detained on account of intercurrent disease may even die, and are in any case a continuing source of anxiety and expense. For these reasons, requests for improvements and equipment calculated to lessen the risk should receive careful attention. When building is contemplated, the prevention of cross-infection should be an overriding consideration, and expert advice should be sought. The only other comment that needs to be made is that a copy of this memorandum should be in the hands of all those who are concerned in any role with the problem of cross-infection in hospitals. A great deal has been done in relation to this problem, which for so many years went unheeded; but much more can certainly be done. The problem is sufficiently serious, and in some cases dangerous, to warrant the most painstaking and best-informed attention that it can get.

¹ "The Control of Cross Infection in Hospitals"; Medical Research Council of the Privy Council Memorandum Number 11 (Revised Edition, 1951), by the Cross Infection in Hospitals Committee of the Medical Research Council; 1951. London: His Majesty's Stationery Office. 9½" x 6", pp. 49. Price: 1s. 9d. net.

Abstracts from Medical Literature.

OBSTETRICS AND GYNÆCOLOGY.

Exploratory Culdotomy as an Alternative to Laparotomy.

JOSEPH BERNARD DOYLE (*The New England Journal of Medicine*, June 21, 1951) describes and illustrates the operation of exploratory culdotomy and claims that this procedure offers a simple method of palpating, visualizing, photographing and taking a biopsy from the pelvic organs. He states that bimanual pelvic examination supplemented by combined recto-vaginal examination, if necessary, is frequently inadequate for diagnosis; peritoneoscopy and culdoscopy have limited use, culdotomy is suggested as an alternative to laparotomy and serves as an extra aid in the early detection of pelvic cancer. The author considers that culdotomy can be performed with less surgical risk, less expense and less psychic trauma than abdominal laparotomy. The operation should not be performed in the consulting room, but in hospital after forty-eight hours' pre-operative treatment with terramycin and vaginal cleansing with saline douches. Under full aseptic and antiseptic measures the cul-de-sac is opened according to a technique described. The usual anaesthetic for exploratory culdotomy is intravenously administered "Pentothal", supplemented, if necessary, with δ -tubocurarine. The author then performs pelvic examination with two fingers through the culdotomy opening. Visualization of the pelvic organs is obtained by means of three endoscopic lights which are inserted through the orifice—one through each lateral angle of the incision, attached to curved malleable silver retractors, and one carried in a small laryngoscope along the anterior aspect of the incision. The author claims that these three lights give adequate visualization of the Fallopian tubes and ovaries, the posterior wall of the uterus, the rectum and the sigmoid colon. A plastic spoon, introduced through the culdotomy orifice, facilitates mobilization and inspection of the ovaries and tubes. According to the author there is no difficulty in performing ovarian biopsy by this technique, and the ovaries can be studied in the investigation of sterility. He suggests that total uterine surgical sampling combined with exploratory culdotomy offers a simple pelvic approach with minimal operative and anaesthetic risk for multiple biopsy of the cervix, endometrium, ovaries, peritoneal surface of the uterus, rectum and sigmoid colon.

Some Aspects of Chorionepithelioma.

ALAN BRENS (*The Journal of Obstetrics and Gynecology of the British Empire*, June, 1950) discusses the salient points in the pathology, hormone assays, treatment and mortality of chorionepithelioma. He states that hydatidiform mole is now generally recognized as an important aetiological factor in the development of chorionepithelioma and occurs in 4% of all human pregnancies. Hertig and Edmonds have concluded that the typical mole is usually derived from an abnormal ovum when the pregnancy

fails to abort—the majority of pregnancies in such cases abort spontaneously before the end of the third month; in 30% of those that continue longer the uterus enlarges at a rapid rate, whilst in the remaining 70% the uterus is of average or below average size. Hormone assays should be interpreted in the light of the following data: (i) A positive pregnancy test result will be obtained in dilutions of 1:100 or even 1:200 about the sixteenth day of a normal pregnancy owing to the peak output of chorionic gonadotropin at this time. (ii) High concentrations of hormone are present in the urine of many patients with a normal multiple pregnancy, or with oliguria from severe hyperemesis gravidarum or toxemia of pregnancy; a positive test result in a dilution of 1:500 or more is unlikely to be encountered apart from hydatidiform mole or chorionepithelioma. (iii) A latent interval of up to six months' duration and probably longer, with repeated negative test results, may occur between the termination of a causal pregnancy and the development of evidence of the presence of chorionepithelioma. (iv) After the successful treatment of a chorionepithelioma, the results of pregnancy tests on undiluted urine become negative within thirty days in 66% of cases and within three months in 95%; a more persistent positive result is of the gravest prognostic significance. (v) A few cases are on record in which a full-term normal pregnancy intervened between the expulsion of a hydatidiform mole and the development of chorionepithelioma. (vi) A long latent interval may occur between the last recognizable pregnancy and the development of chorionepithelioma; intervals of five to thirteen years have been reported. The author states that total abdominal hysterectomy is the treatment of choice for cases originating in the body of the uterus. Conservation of the ovaries in a young patient is permissible as spread is by the blood-stream. Abdominal hysterectomy as a method of diagnosis is to be condemned. Recent figures show a mortality rate of 2% in hydatidiform mole and 10% in chorionepithelioma.

Essential Hypertension Plus Pre-Eclampsia.

W. S. JONES (*American Journal of Obstetrics and Gynecology*, August, 1951) presents a study of pre-eclampsia superimposed on mild benign hypertension, based on 51,840 deliveries over a ten-year period. He states that the incidence of "toxic" cases presented was 2.96% or 1533 patients. The mild benign hypertension was classified by an initial systolic pressure in the 140 to 160 millimetres of mercury range; in the series there were 203 cases, and among these 73 instances of superimposed pre-eclampsia, an incidence of 36%. There was an early onset to this pre-eclampsia suggesting the onset of severe pre-eclampsia in the normal patient; 16.6% of patients developed the disease before the thirty-second week and 52.1% before the thirty-sixth week. Four of the five maternal deaths occurred between the thirtieth and thirty-third weeks; three of the four "toxic" separations of the placenta were at the thirty-fourth to thirty-sixth week. The author frequently observed a sudden rush to send to hospital a patient, seriously ill, when the prenatal record disclosed warnings of

impending disaster at previous visits or the patients were examined too infrequently during the second half of pregnancy. He considers that these patients must be examined weekly after the sixteenth week in addition to urine examinations twice a week or more often and admission to hospital at the first untoward sign. Excess weight gain must be viewed with alarm, but failure of the patient to show weight gain must not lull the obstetrician into a sense of false security. Complications in the group showed that with benign hypertension, the patient has 14 times the normal expectancy of developing pre-eclampsia, 10 times the incidence of "toxic" separation of the placenta, 20 times the chance of cerebral hemorrhage or convulsive phenomena, one-third the hope of obtaining a live baby, and 35 times the normal risk of maternal death.

Aureomycin and Trichomonas Vaginalis.

R. B. GREENBLATT and W. E. BARFIELD (*American Journal of Obstetrics and Gynecology*, August, 1951) report their results in the treatment with aureomycin of 53 patients infected with *Trichomonas vaginalis*. They state that the most satisfactory method of application was by vaginal insufflation of a powder containing aureomycin 0.25 to 0.5 gramme, talc 1.0 to 2.0 grammes and lactose 1.0 to 2.0 grammes, once daily (or every other day), for five consecutive treatments, and then, as prophylaxis, once weekly for five weeks. Trichomonads were absent in the vaginal secretions of 47 of 48 patients who were examined during the first week of therapy. Immediate relief of pruritus and cessation of leucorrhoea were reported by 37 of the 48 patients examined. After one month no recurrence was found in 29 of the 37 patients examined. Vulvo-vaginal irritation attributable to sensitivity to the antibiotic was noticed in 16 cases; in eight cases, vaginitis due to yeast-like organisms occurred. The use of aureomycin-lactose powder has prevented the occurrence of these complications.

Granuloma Venereum.

LAURENCE L. HESTER (*American Journal of Obstetrics and Gynecology*, August, 1951) states that any ulcerating lesion of the labia or fourchette that is moderately painful and tender to the touch and presents a rolled purplish edge could be *granuloma venereum*. He reports a series of 45 cases from the Medical College of the State of South Carolina. He states that in diagnosis the tests performed are a full blood count, Wassermann and Kline tests, dark-field examination of the lesion, biopsy, smear for examination for Donovan's bodies, Frei test, culture for Ducrey's bacillus if these tests are not diagnostic, and total and fractional estimation of serum proteins if the lesion is *granuloma venereum*. The author found that biopsy was the best diagnostic procedure. He states that diagnosis of *granuloma venereum* of the cervix is a laboratory procedure, because carcinoma of the cervix, chronic cervicitis and *granuloma venereum* cannot be differentiated on speculum examination. In this series 26 of the primary lesions were on the labia majora or labia minora; the fourchette was the seat of the primary lesion in 11 cases and the cervix in seven cases. Only one case was primary

in the vagina. *Lymphopathia venereum* was present as well in 10 cases, and syphilis was or had been present in 26 cases. Treatment is now by means of aureomycin, streptomycin or "Chloromycetin". In this series streptomycin was used—20 grammes total on a ten-day or five-day course—and there have been no relapses or recurrences over a period of two and a half years. Plastic operations on perineums scarred by healed *granuloma venereum* now heal by first intention, and the antenatal administration of streptomycin in known cases reduces the fetal mortality and maternal morbidity.

Abdominal Pregnancy.

J. B. CROSS, J. R. MCCAIN AND W. M. LESTER (*American Journal of Obstetrics and Gynecology*, August, 1951) review a total of 19 cases of abdominal pregnancy in the light of diagnosis and management. They state that in 16 cases the diagnosis was established prior to operation, but excessive time was consumed in many cases before the correct diagnosis was made. Seven cases were followed in the clinic or hospital longer than two months after they had become symptomatic, and only eight patients had correct diagnoses made pre-operatively within one week of the onset of symptoms. Five patients were classed as non-pregnant, but with an abnormal pelvic mass, six as having missed abortion, missed labour or false labour, and two as having a normal pregnancy with pelvic neoplasm. The authors call attention to abnormal symptoms and signs in obstetrical conditions which should be helpful in aiding the diagnosis. Persistent abdominal pain or tenderness was present in seven cases (but not appreciated in five). Definite displacement of the cervix is described as a valuable sign that the pregnancy is not normal; it was found in nine cases. In five cases there was a high position or transverse lie of the fetus. The authors state that signs of fetal death should cause a serious reevaluation of the pregnancy—in at least four cases this would have led to an earlier correct diagnosis. The identification of an extrauterine mass is most helpful, and by ordinary methods was demonstrated in only three out of sixteen possible cases. The authors consider the "Pitocin" test, used to identify an abdominal mass as distinct from the uterus, the most valuable single aid in the early diagnosis of abdominal pregnancy. With full precautions one minim of pituitary extract is given subcutaneously, followed by five minims in fifteen minutes if no contractions occur. The vaginal hand distinguishes between the contractile uterus and non-contractile mass. The authors also state that X-ray examinations are a valuable aid to diagnosis; abdominal pregnancy is suggested by a fetus located abnormally high in the abdomen or in a transverse lie, a fetus whose position remains constant on repeated studies, fetal parts immediately below the abdominal wall, or the absence of a uterine shadow. No advantage is to be gained by delaying operation after the patient has become symptomatic. The fetus was macerated in 12 cases, dead but not macerated in three, and living at operation in four. If maceration is present, maternal infection is likely to occur (five cases out of six). Hemorrhage is more frequent if the fetus is living or recently dead, and the

placenta in such cases should not be disturbed. Infection was present at the time of surgical intervention in six cases; five of the patients had serious post-operative morbidity, and three died. The placenta was removed completely in 11 cases, removed partially in four cases, and left intact in four cases. With partial or complete removal of the placenta the bleeding was excessive in 10 out of 15 cases, and morbidity was increased. The blood loss was not excessive if the placenta was undisturbed, and there was no morbidity. The abdomen should be closed without packs or drains if possible. Morbidity occurred in seven cases; three of the patients died, and in addition a fatal pulmonary embolism occurred in one case on the fourth post-operative day. Pre-operative infection and/or excessive blood loss at operation had been present in all of these eight cases.

Chorionepithelioma Occurring during Pregnancy.

D. J. MACRAE (*The Journal of Obstetrics and Gynecology of the British Empire*, June, 1951) describes a case of chorionepithelioma which occurred during pregnancy. He discusses certain aspects of the case and reviews previously reported cases of chorionepithelioma associated with pregnancy, hydatidiform mole and ectopic gestation. The patient was a quadri-gravid woman with a normal course of pregnancy up to the thirty-third week. She was then admitted to hospital with ante-partum vaginal bleeding. Examination under anaesthesia showed multiple bluish vaginal nodules, two of which were bleeding. Ligature was performed at the base of the bleeding nodules with biopsy. Blood-staining of sputum led to X-ray examination of the lungs and a diagnosis of metastatic tumour deposits in the lungs. Examination of the vaginal deposits showed typical chorionepitheliomatous metastases. The urine yielded a positive result to the Aschheim-Zondek test at dilutions of 1:1000. Twelve days later Cesarean hysterectomy was performed, and a living baby was delivered. A small yellowish excrescence was found on the surface of the placenta, and at the placental site of the uterus there was a raised area three centimetres in diameter. Both these were subsequently proved to be chorionepitheliomatous growths and are considered to be the primary tumour. The patient's condition deteriorated, and she died on the seventh post-operative day. Post-mortem studies are recorded and section slides are illustrated. The tumour projecting from the placenta extended into healthy placental tissue. The tumour on the uterine wall extended deeply into the uterus from a base of about three centimetres' width. Lateral vaginal veins were found to contain chorionepitheliomatous emboli. The author states that chorionepithelioma in the normal placenta is rare, and it is usually found that trophoblastic elements detached from the placenta and situated deeply in uterine muscle are prone to malignant changes. Microscopic examination in the case studied does not show whether the malignant cells are invading normal villi or growing from villi. There is an absence of villous stromal formation in the tumour growths. The author considers it possible that primary malignant chorionic cells originated

deep in the uterus from desquamated villous elements and that the tumour has spread to the placenta and disseminated to the lungs and vagina. Haemorrhagic metastases in the vagina, as in this case, often afford the first means of diagnosis of the condition. The urine from the child at birth yielded a negative result to the Aschheim-Zondek test, indicating failure of spread of the growth to the fetus despite the proximity of the tumour to the umbilical cord. The author would apply to all forms of trophoblastic growth Ewing's term chorioma. These, he adds, would fall into two groups: localized chorioma and generalized chorioma. The former group includes *chorioadenoma destruens* (Ewing), malignant or destructive mole and *chorionepithelioma-in-situ* (Hertig); the latter group includes *chorioma malignum* (Novak), chorionepithelioma and the metastasizing malignant mole. The author considers that generalized chorioma should be treated by means of total hysterectomy and bilateral salpingo-oophorectomy with irradiation of secondary deposits.

Reimplantation of the Fallopian Tubes.

MARGARET MOORE WHITE (*The Journal of Obstetrics and Gynecology of the British Empire*, June, 1951) describes a technique of reimplantation of the Fallopian tubes in the treatment of sterility due to tubal occlusion. The case histories are recorded of four women, sterile on account of tubal occlusion. Three patients were found to have bilateral cornual tubal occlusion following attempts to procure abortion. One patient had a history of gonorrhoeal infection. Six of the eight implanted tubes were subsequently shown to be patent as a result of the operation. Two of the women conceived, one being delivered at term and the other having an abortion in the early months of pregnancy. The technique employed is described and illustrated by the author. The operation is performed shortly after the cessation of a menstrual period to permit post-operative tubal insufflation before the onset of the next menstrual period. Laparotomy is performed, and air is injected into the fimbrial opening of the tube to determine the site of tubal occlusion. The tube is then divided on the patent side of the occlusion, and the patent portion of the tube to be reimplanted is divided on each side for a distance of one-third of an inch. A circular portion of the uterine wall is excised, a new opening being thus made into the uterine cavity at the cornual region. Manipulation of the patent tube into the hole in the uterus is facilitated by the passage of a small probe along the tubal lumen. The tube is withdrawn, and a stitch of gossamer silkworm thread is passed through the outer coats of one split portion of the tube. The needle is then passed through the aperture made in the uterus and drawn through the uterine wall. The other end of the suture is threaded on a fine needle and passed through an adjoining part of the uterine wall. The same procedure is repeated on the other split portion of the tube and the two sets of sutures are tightened and tied. The cut edges of the uterine wall are then sutured to the outer coat of the tube. Tubal insufflation is performed ten days after operation and repeated after the next menstrual period.

Medical Societies.

SYDNEY INSTITUTE FOR PSYCHOANALYSIS.

THE first official meeting of the Sydney Institute for Psychoanalysis was held on August 17, 1951, in the William H. Crago Council Chamber, British Medical Association House, 135 Macquarie Street, Sydney. Dr. R. C. Winn gave a short report of two directors' meetings. At the first he had been formally elected chairman of the institute, and Dr. S. Fink, treasurer and librarian, Andrew Peto (M.D., Budapest) being training analyst and secretary. The credit balance was £1101 11s. 6d., derived from three donations, all preliminary expenses having been paid. Dr. Winn said that a free course of psychoanalytical seminars would be arranged if those interested wrote to the secretary at 143 Macquarie Street, Sydney.

Delinquency.

ANDREW PETO opened a discussion on delinquency. He said that he would like to discuss juvenile rather than adult delinquency, and mainly from the point of view of prevention. All research showed that prevention was the real solution. All magistrates who were not prejudiced in favour of retaliation were aware of the fact that talion punishment offered little to the solution of the problem of delinquency. Most of the personnel involved were not adequately trained for understanding or providing suitable treatment for the delinquent. The prison system was not abreast with scientific progress. Adult criminals, however, were almost beyond help owing to age, mental attitude, imprisonment etc.

The last war and its aftermath had provoked, as usual, a tremendous increase in crime, particularly crime committed by juveniles. Under the shadow of a threatening third world war one could forecast an increasing wave of criminality. To cope with that increase adequate scientific preparations were essential. Andrew Peto said that he had come into close contact with those problems in his role as psychiatrist to the Juvenile Court in Budapest. He had been in charge of an institute for the investigation of juvenile delinquency. While holding that appointment he had had opportunity to examine thoroughly about 150 juveniles, most of whom were lads aged between twelve and eighteen years. The social background and the upbringing of those juveniles were investigated by specially trained social workers. The juveniles were also observed by the staff of a reformatory and by that of a prison. A further official duty of the speaker was the routine supervision of five reformatories, three for boys and two for girls, with about 850 inmates in all. In addition he visited a prison for male juvenile delinquents who had been sentenced to more than five years' imprisonment for arson, manslaughter or murder. Those delinquents were part of the harvest of the first post-war year. The conclusion he had formed as a result of his experiences was that further research was required into the following main questions:

1. Delinquency was a completely psychological problem of traumatic origin. The social factor played only an indirect role, and that in two ways: (a) frustrating social conditions stirred up aggression; (b) poorer parents were less able to protect their antisocial children than those who were better off.

2. Antisocial activities could be traced back in many cases to the earliest childhood of juvenile delinquents. The first three to five years of life and particularly the child-mother relationship were probably of paramount importance. Two categories might be distinguished: that of the extremely neglected children, and that of the extremely spoiled children. Lack of care and love caused permanent emotional frustration which disturbed the child's attachment to the parents and to the siblings. The stirred-up aggression and the frustration distorted the development of the ego. That disturbance found expression in a weak ego that could not bear tension and strove for immediate instinctual satisfaction. Because the premium of love was not given as a compensation for the abandonment of instinctual desires, the ego could not learn how to resign. The same process hampered the development of a fairly normal guilt feeling. Incidentally, the number of delinquents whose behaviour was a response to feelings of guilt represented a small minority. An example was given to show the importance of psychological trauma in early infancy as a cause of delinquency: A patient who had spent years in the prostitute underworld, where he lived a bisexual life, had been extremely neglected and ridiculed by both father and mother. When three years old he had set fire to their flat. Later

on he had regularly stolen money from his parents. He had married a prostitute, and been imprisoned for attempted blackmail when he caught a man with his wife in a pre-arranged sexual situation. His childhood experience was one of frustration and neglect. On the other hand, there were a large number of criminals who could be labelled "spoiled children". When young they received excessive attention from over-anxious parents, mostly mothers, and the first years of life were spent in very close emotional contact with their parents. An example of that type was a patient who was a professional gambler and card-sharpener. His first wife was a prostitute. He had been breast fed until the age of five years; he regularly slept with his head on his mother's breast in childhood, and until she died when he was twenty-one years old he continued to occupy the double bed with her. His gambling and cheating meant escape from the dangerous mother image.

3. The speaker's experiences led him to think that practically all delinquent children were neurotic or at least showed definite emotional disturbances. An important and not yet systematically investigated problem was the mental status of the delinquent after the cessation of his criminal activities. Juvenile delinquents widely outnumbered adult criminals. In some cases, delayed maturation processes in delinquents might be taken into account. It was often found that the immediate consequence of a delinquent's losing his antisocial behaviour was a neurosis of some kind as an alternative expression of the psychic tension which still persisted. The gambler mentioned earlier had given up cheating at the age of forty years and married a decent girl. Afterwards he developed an anxiety neurosis, depressive symptoms and impotence. His analysis revealed that he had to find new defences to overcome his anxiety.

4. The speaker thought that most criminal acts represented instinctual aggression. Careful investigation or psychoanalysis made it possible in most cases to trace it back to early traumata. Some criminal acts of juveniles could be diagnosed as displaced substitutes for infantile sexual activity. Most of that type showed a compulsory character, an example being provided by a girl, aged ten years, who decoyed little boys of about three years of age to lonely places where she undressed them, and subsequently she sold the clothes. Besides emotional frustration and consequent hatred against the mother, sexual curiosity and rivalry were her main motives.

5. Important observations were made in concentration camps. The speaker had also noticed that during and under the siege of Budapest prolonged hunger and undernourishment combined with continued fear of death, general instability of living conditions, and pronounced disorganization in personal and civic hygiene caused deep changes in personality in those people particularly who had previously lived under safe and established conditions. The changes in personality were reversible in adults, but tended to persist in children, even though the majority did not become delinquent. During the siege and its aftermath unbalanced and disproportionate emotional reactions were characteristic, leading to useless looting, joy in foolish destruction, indifference towards the suffering of others, and childish avarice. The acts were purposeless and unreasonably motivated. People looted trifling tit-bits while they suffered from hunger and cold. They walked miles in the snow to take part in the looting of such things as heavy iron bars, children's hats and machine parts; they dragged them a long way towards their homes before throwing most of them away. One patient of the speaker could not resist the urge to steal food, even though she did not suffer from hunger, and though she risked her life in doing so, because if detected she would have been expelled from a home where she was safe from Nazi persecution. Psychoanalysis with her and with other patients revealed anxieties of earliest childhood, the infantile fear of being lost and of starvation. To act delinquently meant an attempt to overcome that kind of anxiety.

6. The treatment of juvenile delinquents was a hard and mostly thankless task. The efforts of psychotherapist, teacher and parent had to be united to achieve any lasting results. The speaker's own experiences were encouraging only when manifest neurotic symptoms coexisted with the delinquency. Most authors stated that material help such as money was an indispensable precondition for success. The leading principle of the psychoanalytical approach was that of Alchorn, who tried to transform the delinquent into a neurotic so that the patient should experience conscious suffering and then be treated for his neurosis.

DR. S. FINK said that because both neurotics and delinquents had a weak ego, the deficiency could not be a decisive factor in originating delinquency. He considered the decisive factor to be the difference between sadism and

An inspiring example of the sense of community among English people was to be found in their enjoyment of aesthetic pleasures. Throughout the length and breadth of the countryside were hostels in which young people, and

some older people, too, of all classes, found accommodation which enabled them to enjoy holidays in remote and beautiful places. There was rich and varied activity in the drama, ranging from the strong revival in morality plays in small parish groups and performances of the plays of Bernard Shaw and T. S. Eliot in the broad local tongue in rural women's institutes, to highly stylized and sophisticated London productions of the French comedies of manners of Anouilh, the brilliance of opera and ballet at Covent Garden and the magnificence of the Shakespearian productions at the Old Vic Theatre and at Stratford-upon-Avon.

In the special air-conditioned rooms of the London National Gallery were some of the nation's most treasured and valuable pictures, which had been renewed in splendour by a new cleaning process. The process had been perfected in the deep chalk caves of the Cheddar Gorges when the pictures were housed there while bombs were falling on London. The gallery was badly "blitzed", but all through the war years one superb picture had been hung there, the picture being changed each month. People of all kinds had flocked to see it in their lunch hours and after work, as a respite from horror. Those pictures became familiar to many; there were crowds around them during week-ends and hot arguments about the effect of cleaning upon favourite "Old Masters".

In their time of trial, all sorts and conditions of English people had turned to music for inspiration and relief, and England might again be described as the "nest of singing birds" which the first Queen Elizabeth loved. For example, in one very large boys' great public school which Miss Ogilvie visited, every second boy either sang in a choir or played in a musical ensemble such as a string quartet, and their performances were of a very high order. There were innumerable groups of amateur musicians, a great multiplicity of choirs of all kinds, and annual festivals of music not only in Edinburgh but also in other provincial cities. There was a resurgence of pride in and enjoyment of the early English musical mode; and in choral music particularly there was delight in fitting most beautifully the sound and meaning of the poetic English phrase to its musical counterpart.

Miss Ogilvie then referred to the question of the care of the sick and disabled. She said that the military mobilization of the nation to meet the threat of war had had its complement in national organization on an unexampled scale to meet such hazards as poverty, old age, ill health and disablement by provision of educational, social and health services. It was, Miss Ogilvie considered, a matter of amazement that the Coalition Government of both parties took time in the midst of war to consider those services and to agree upon the Acts which were passed to provide them. National services on the scale adopted were a departure from the traditional pattern of British social organization, which had been predominantly a combination of private enterprise, voluntary philanthropic effort and local government authority. The principle that health services, including medical and hospital care, should be provided free in return for compulsory insurance contributions seemed now to be generally accepted; there was much criticism of the method—for instance, of the waste of time and money which seemed to go with huge administrative machinery and extravagance and ineptitude on the part of officials who were unversed in professional standards. However, there was provision under the *National Health Act* for a healthy degree of decentralization in control and administration, and that was giving full scope to the British flair for gradual modification and improvement of social systems; for example, the hospitals in local areas were grouped together under the control of a representative committee, which was responsible for providing adequate hospital services for the area. Those committees were themselves interesting; for example, in one rural area in southern England the local committee managing the hospitals included several retired admirals, generals and high-powered business men; the chairman was an admiral, and he summoned all the ferocity of quarterdeck language to pulverize any government official who attempted to direct him. The group committee controlling ten hospitals in one industrial city had for its chairman a weaver who usually operated a loom in a woollen mill; he had proved his quality in thirty years of service as a local alderman and mayor, and the firm employing him had released him on full pay for the term of his service as chairman, so that he might devote all his time to his hospital work. The committees were charged with the task of providing appropriate hospital services in their areas for all kinds of patients—for example, the chronically ill, the frail elderly invalid, as well as the acutely ill; and they also were accepting responsibility for providing rehabilitation centres for hospital patients.

In areas where there was a teaching hospital, the board of the hospital took the major responsibility for the hospital services in the district, with consequent improvement in standard of professional practice; for example, Saint Thomas's Hospital was concerning itself with the standards of the eight other hospitals in the Lambeth district. Unfortunately the economic crisis in Britain had hampered the development of hospitals, led to stringent control of finances by the central government and put severe obstacles in the way of group management committees, which had to be content with very slow progress for the present. However, even the most conservative and experienced administrators of teaching hospitals with whom Miss Ogilvie discussed the present system of hospital grouping were in favour of it. Already some weaker hospitals were being improved and new services introduced—for example, for chronically ill patients.

There was a similar tendency to decentralize control of other health and social services, either by delegating them to the local authority, as in the case of the welfare of old people, or by establishing district offices which worked closely with other local activities, as in the Ministry of Labour. England had a long tradition of responsibility in local government, so that already the somewhat doctrinaire methods of a large central ministry were being modified at the periphery by the consultation and cooperation between the various local officials.

A second and very important characteristic of English social life was the tradition of cooperation between statutory authorities, voluntary social agencies of various kinds, and philanthropic groups interested in social welfare. That pattern persisted and was being enhanced by the approval and financial support given by both central and local government to numerous voluntary activities, such as convalescent homes, rehabilitation centres for people with particular disabilities, welfare homes for old people, the "meals on wheels" service to invalids in their homes, sheltered workshops and housing associations.

There were, in addition, vigorous local activities in which responsibility was shared between the Government and voluntary groups; for instance, the motor-car transport service for hospital patients was operated by voluntary owner drivers, organized by the Women's Voluntary Services and the Red Cross, with responsibility for administration and finance met by the Government.

One of the most interesting examples of social service on a national scale was to be found in work for the rehabilitation of the disabled. The term rehabilitation was now commonly used to describe the process by which an ill or injured person was helped to return as soon as possible to productive activity. The first and most important part of the process had always been the medical treatment of the patient. But recently additional services had been developed to help people to overcome residual disability by physical exercises, occupational therapy, help with financial and social problems, retraining and especially selected employment either in industry or in sheltered workshops. Before the war there had been isolated examples of the work in such enterprises as Saint Dunstan's centre for the blinded, Papworth Village Settlement for the tuberculous, the Lord Roberts Workshops for disabled ex-servicemen, and the Oswestry Orthopaedic Scheme. Those and other voluntary schemes were still in operation, some of them aided by government subsidies. Also, particular industries had found it worth while to maintain rehabilitation centres within their own works; for example, the Vauxhall motor works at Luton cooperated with the local hospital in making most ingenious "Perspex" surgical splints and modifying various pieces of machinery to enable injured employees to return very quickly to work in their rehabilitation centre, which was attached to the factory. The officer in charge of the centre claimed that time lost because of injury had been reduced most dramatically; for instance, patients with Pott's fracture returned to work in fifteen days, and those with Colles's fracture returned to work on the day of injury. Miss Ogilvie said that when she visited the centre she saw a boy operating a specially designed machine for making screws two days after his index finger had been amputated.

During the war the work of Sir Reginald Watson-Jones, in rehabilitation of air force casualties and the establishment of special accident centres for civilians as part of the emergency medical service, had drawn attention to the value of rehabilitation services for the generality of ill and injured people. At the same time the Ministry of Labour, impelled by the dire shortage of manpower and large number of civilian casualties, had set about establishing rehabilitation services for people of all ages and with all types of disability, with particular reference to reemployment; a comprehensive national scheme to that end was

now in operation. There were government industrial rehabilitation centres, both residential and non-residential, in many districts, to which patients might be referred by hospitals or private practitioners to undergo a process known as restoration and assessment for retraining and reemployment. There the patient was advised by a team consisting of doctor, vocational guidance officer, social worker and reemployment officer. His treatment included rest, physiotherapy, physical education, games and supervised work. His main activity was in work, either at benches or in the class room, under instruction. First-class foremen craftsmen, well versed in industry, taught the disabled patient processes involving the use of lathes or other machinery, and the reports of those supervisors on the patient's behaviour, adaptability, power of concentration and manual skills were used by the advisory team to assess his potentiality for work. In some centres there were classes in elementary office work, and in one centre visited a man with double amputation was trying his artificial hands at draughtsmanship, and a middle-aged labourer with heart disease was reviving his schoolboy flair for arithmetic in the hope of being able later to take a course in book-keeping. Patients stayed at the centres for several weeks as a preliminary either to a training course or to finding work. They were referred by private practitioners, by medical officers in the various services and from hospitals. Almoners had much to do in arranging for hospital patients to go to the centres.

One of the disadvantages in the centres was the fact that patients might not be referred to them until they had been discharged from the hospital; because of that there were unnecessary delays and there was very little mutual consultation between the doctor who treated the patient during the acute stages of his illness and the medical officers appointed to the rehabilitation centres. The medical officers were often part-time officers and relatively junior. Some of them seemed to be making little impact upon the discipline and regime of the centres, which were controlled and directed by non-medical administrators. It seemed that in some cases the selection of the patients could have been more skilful, and that some extravagance and wasted effort could have been avoided if a more experienced and consistent medical control had been available.

For people whose disabilities prevented them from returning to their former trades and who were considered suitable for retraining, the Ministry of Labour maintained training centres. The programme was worked out in consultation between employers and trade unions so as to ensure that instruction was given only in occupations in which there was a shortage of labour. Courses varied in length from a few months for semiskilled trades to several years for full professional education, and the scheme was much in advance of the present retraining schemes in Australia.

An interesting aspect of the rehabilitation service was that which was concerned with reemployment. Disabled people were registered with the Ministry of Labour, and the resettlement officer in each district was responsible for ensuring that the industries in the district employed their quota of 3% of disabled people which the law required. There were conflicting opinions of the efficacy of the compulsory quota system, and much depended upon the industries which were available in the patient's district; for instance, in Glasgow most of the industry was very heavy, and there was difficulty in finding light jobs. Much depended upon the honest cooperation of employers and upon the calibre of the disabled person. Although there were benefits and opportunities attached to being registered as a disabled person, the effect of this upon the morale of some patients was in question.

A valuable feature of the reemployment service was in the local advisory committees which were set up in each borough. Miss Ogilvie attended a meeting of the Walworth committee, which consisted of representative employers and employees, social workers from local social agencies, almoners and the local Ministry of Labour officials. At its regular monthly meeting, the committee discussed any matter relevant to the employment of disabled persons, such as problem cases of severe disability, ways of interesting employers in the scheme, and methods of improving efficiency in administration. There seemed to be an excellent spirit of cooperation, and reports indicated that the firms in the district were quite kindly disposed to their new obligations.

For people who were too ill or too grossly disabled to work in normal industry, there were sheltered workshops, known as "remploy" factories, financed by the Government and controlled by a national corporation. They were being

established throughout the country to provide light work and short hours at the normal basic wage rate. The factory visited in Glasgow was producing surgical boots for the patients of the city hospitals. Some of the workers were very ill, but they preferred employment to living on a pension. The medical officer in charge was himself severely crippled by paraplegia; he gave the following list of the disabilities suffered by the workers under his care: organic nervous disease (including epilepsy and disseminated sclerosis), 50; pulmonary tuberculosis, 11; other chest conditions, 9; amputations, 10; surgical tuberculosis, 6; heart disease, 6; psychiatric conditions, 4. Some of the workers were very slow, others objected to discipline, and in consequence the cost of producing the boots was high, but on the whole it seemed to be money well spent. It was thought that some epileptic people working in "remploy" workshops could have been more appropriately employed in normal industry if employers would have them. The problem of finding employment for epileptics had not been met, and it was receiving much attention; one theory was that people with epilepsy could best be employed in groups, and one Scottish firm employed 50 epileptics with success.

Finally, Miss Ogilvie referred to an aspect of the rehabilitation services in Britain which was related to a changing concept of the function of public hospitals. Health authorities, medical officers and almoners in hospitals were convinced that the Ministry of Labour should limit its rehabilitation service to retraining and reemployment, and that the earlier stages in the rehabilitation process should be more closely linked with clinical treatment of the patient. The work of almoners, the attention given in clinical teaching and research to the social and industrial aspects of medicine, developments in physical medicine and the reorganization of hospitals under the National Health Act had all combined to introduce into hospitals a new interest in the social adjustment of the patients. More time and attention was being devoted to a study of the conditions under which the patient lived, his personality and his behaviour, and to ways of helping him to recapture a useful place in the community. With encouragement from the Ministry of Health, many of the larger hospitals had established departments of physical medicine. They were under the direction of specialists in physical medicine, who held consultant rank and had extended and intensified the work of physiotherapy and occupational therapy departments in their hospitals. For example, at Saint Thomas's Hospital and King's College Hospital there was a very active programme of physical reeducation and physiotherapy directed to the reconditioning of particular groups of patients for a return to activity and independence either in their homes or in industry; and the occupational therapy sections in those hospitals included workshops equipped with lathes and other machinery for light metal work and joinery, so that suitable patients could be reeducated and assessed for employment while still under active treatment.

Directors of physical medicine departments collaborated with the clinicians and almoners in their hospitals in plans for rehabilitation of patients; they also made it their business to know about industrial conditions in their districts and to cooperate with local reemployment services. In some hospitals there were weekly conferences between the director of physical medicine, the almoners and district reemployment officers, at which patients whose disabilities presented special difficulties were guided to suitable employment. In other hospitals the doctor in charge of the teaching of social medicine concerned himself with those problems. For instance, in one Glasgow university hospital the professor of social medicine, who was himself expert in industrial medicine, was available for regular consultation on patients for rehabilitation, with members of the medical staff, almoners and Ministry of Labour officials. Some of the doctors sat on district employment committees, thus forming a useful link between the hospital and local industry. In a few hospitals, such as the Birmingham Accident Centre and the Royal Infirmary, Newcastle, doctors and almoners on the hospital staff visited factories and mines to see for themselves the conditions under which their patients were working. A recent and most valuable experiment about to be undertaken by some hospital group management committees was to establish rehabilitation centres in their districts to serve all disabled people in the area. The centres were to be financed by the Ministry of Health, and staffed and controlled by the teaching hospitals or leading general hospital in the group; that would ensure that the programme of rehabilitation for each patient was closely linked with clinical practice and was supervised by a specialist in physical medicine, working with physicians or surgeons in the hospitals from which patients were referred.

Thus British hospitals were undertaking new responsibilities in a spirit of cooperation with other public services, when that seemed to be appropriate in the interests of the sick and disabled people whom they served. Miss Ogilvie believed that their example was worthy of the attention of hospital authorities in Australia. There was in Australia the beginnings of a nation-wide rehabilitation service conducted by the Commonwealth Department of Social Services. So far the contribution of hospitals to the scheme had been generally limited to the traditional role of clinical treatment of patients in the more acute stages of disability. It was to be hoped that there would be an extension of rehabilitation services within the larger public hospitals and rehabilitation centres connected with groups of hospitals, and that there would be greater collaboration between hospitals and industry in discovering suitable avenues of employment for disabled people. In such experiments in social activity, Miss Ogilvie concluded, there might be nourished in Australia a spirit of enterprise for the common good, which, as she had tried to show in her address, was alive in Britain today.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

GOVERNMENT MEDICAL OFFICERS ENGAGING IN PRIVATE PRACTICE.¹

[*Australian Medical Journal* (Editorial), February 1, 1847.]

The foregoing article has suggested to us another subject which appears to us to require a remedy.

We allude to Government Medical Officers, either civil or military, being allowed, while on active service and receiving full salaries or pay, to enter into competition with the rest of the profession as private practitioners. In the infancy of the Colony, when they were perhaps the only medical men here, such a practice was inevitable; but why it should have been permitted to continue when private practitioners became sufficient, not only in numbers but in talent and respectability, for all the wants of the colonists, is only to be accounted for by the supineness of the profession, engendered by the jealousy and distrust which avowedly prevail to so injurious and absurd an extent among them. To remain passive now when competition is producing such degrading and ruinous results as we witness every day would evince a degree of stupid apathy with which no other set of men in the world would be chargeable. It is preposterous that such men as Dr. Dawson, Mr. Savage, Dr. Silver &c. who are receiving handsome salaries for the performance of important public duties, should be permitted to enter into private practice, adding to the number of labourers in a market already overstocked; and we cannot believe that they can do this without neglecting in a degree, more or less, those duties for which they are specially paid. Besides that they do not meet us on equal terms. The introduction to society which their position gives them, and the prestige of their appointments, enable them, at once not only to gain an amount of practice which falls to the lot of but few among ourselves—and that only, in general, after years of toil and difficulty—but also to charge higher fees than a private practitioner can ordinarily do, thus injuring the latter in every way. Let it not be said as an excuse for this, that they are not paid an equivalent for their public service. There is no reason why, because they are not sufficiently remunerated from the public funds for the duties they have to perform, that they should be allowed to eke out the deficient pay at the expense of one portion only of the public and that notoriously the worst remunerated and who are thus doubly fleeced: first as a part of those who contribute their quota towards the payment of these persons' salaries, and afterwards by having these same individuals entering into a most unfair and unequal competition with them. We cannot believe that the Duke of Wellington and Sir James MacGrigor are aware that Dr. Dawson, sent here to perform the important, and, we imagine, not very light duty, of Inspector-General of Hospitals, is in the service and the pay of an Insurance Office, and that he is also acting in every respect, except in the dispensing of drugs, as a general practitioner in medicine, surgery and man-midwifery. We feel convinced that a

¹ From the original in the Mitchell Library, Sydney.

representation of these facts in the proper quarter would be attended to. It will then be the fault of the private practitioners themselves if such a grasping monopoly of power, patronage, and pelf, is allowed to continue.

Correspondence.

PRE-BRONCHIECTASIS.

SIR: I feel I must join issue again with Mr. Harwood. In his letter of November 17 he does not answer the questions raised by Mr. Sutherland or myself. If I may quote again from Mr. Harwood's original paper, the aim of treatment should be "to establish a clear and adequate airway to the alveoli, and to reestablish normal physiological upward drainage by ciliary wafting, tussive squeeze and the blast of the cough itself". This is precisely what physiotherapy aims to accomplish, and it is a physiological method. As Mr. Sutherland states in his letter, this method "is more rational because it is repeated several times a day, and is, therefore, constantly attacking the problem".

I would like to emphasize again that if chest physiotherapy is to be effective it must be adequate. One sees patients who are said to have been taught physiotherapy, but one finds, on questioning them, that all they have done is attend some physiotherapy department where they were made to skip, ride a stationary bicycle, wave their arms about violently, and touch their toes. On examining such patients they always exhibit gross faults of breathing, such as poor basal chest movement, poor, or even paradoxical, diaphragmatic breathing, and poor general posture. These have never been corrected, and in addition, they have never been taught to do forced expiratory movements—the "tussive squeeze" that Mr. Harwood quotes—which helps so much in clearing the smaller bronchi. It is a fact, which I have had occasion to observe in the last eighteen months, that very few physiotherapists in Sydney have sufficient knowledge or experience to teach patients adequate physiotherapy.

Any comparison between the methods of "bronchoscopic lavage" and physiotherapy must take this fact into consideration. Mr. Harwood states that he looks forward to publication of a series of cases treated by physiotherapy. I personally have no intention of writing about a method which has been accepted for so long in so many clinics throughout the world. The final proof will rest with general practitioners and physicians who see these cases and observe the results of treatment. I submit that the basis of management of pre-bronchiectasis or established bronchiectasis, should be to use the physiological methods of physiotherapy, together with ancillary methods of treatment, such as clearing upper respiratory tract infection. There will remain a few cases with the disease sufficiently localized to be cured by lobectomy.

Yours, etc.,

IAN MONK.

135 Macquarie Street,
Sydney,

November 20, 1951.

ACUTE ACCIDENTAL POISONING IN CHILDREN.

SIR: Dr. Clark Ryan's interesting article in THE MEDICAL JOURNAL OF AUSTRALIA for November 24, 1951, throws some doubt on the value of gastric lavage in poisoning by phenobarbital. The substance is slowly absorbed, and the following experience would seem to establish at least the value of early lavage in such cases.

A child, aged twenty-one months, was missed for some two minutes, and discovered consuming the contents of a bottle of phenobarbital tablets. Strong solutions of sodium bicarbonate and also of salt were forced to be ingested by the victim, and emesis did not result. By the end of about five minutes, gastric lavage with a stomach tube was commenced. This manoeuvre was greatly impeded by the otherwise fortunate fact that the stomach contained a recent meal in which French beans had bulked largely, and the apertures in the end of the tube blocked often, so that some half-dozen withdrawals and reinsertions of the stomach tube had to be carried out, and large volumes of water, approximating to two gallons in all, were employed in evacuating the stomach. Numerous disintegrating white tablets were observed in the recovered fluid, and careful assessment later of the contents of the phenobarbital bottle before and after showed that the amount of this drug ingested was well above twenty grains. No picrotixin, antibiotic or any other

form of treatment was employed, and the child subsequently went to sleep and awakened neither before nor after the times dictated by its usual routine governing such matters; in fact no effect whatever of phenobarbital intoxication was observed. No pulmonary complications developed, and a main purpose of this communication is to suggest that any discussion on gastric lavage might well emphasize the cardinal importance of having the subject of it face down. The more traditional positions of face up or sitting up are surely responsible for much of the opinion against the use of gastric lavage, since their use renders contamination of the air passages almost inevitable; to quote Marriott: "Immediate death from drowning or later death from bronchopneumonia may result. . . . It is much easier to hold down a struggling patient in the prone than the supine position, quite apart from the fact that his fighting is less ferocious when he is not literally contending for his life."

Yours, etc.,

ROBERT B. SPEIRS.

143 Macquarie Street,
Sydney,
November 24, 1951.

Reference.

Marriott, H. L. (1939), "The Treatment of Acute Poisoning", "Pye's Surgical Handicraft", Eleventh Edition.

A CASE OF DEATH FOLLOWING SECTION, LIGATION AND INJECTION OF VARICOSE VEINS.

Sir: Dr. Coppleson has taken me to task, in a letter to you of November 10, for stating that "Ethamolin" was a dangerous substance to use in conjunction with ligation and section of a vein. Certain statements in his letter call for a reply. My conclusions are based on personal experience, and my reasons for regarding "Ethamolin" as a dangerous sclerosant have been given at length in the article referred to by Dr. Coppleson in his letter (Lawes, 1951a). I do not propose to go through it all again. I will state, however, that one-third strength "Ethamolin" is a satisfactory sclerosing agent at operation without any corresponding

increase in dose, and there can therefore be no justification in using full strength "Ethamolin", which is, of course, three times as strong.

Dr. Coppleson states "the phlebitis after its ['Ethamolin's'] use of which Dr. Lawes complains in a previous article cannot be avoided, as its mode of action is by the production of a chemical phlebitis" and "I have found it ['Ethamolin'] has been free from any untoward result or complication". Let me state clearly what I complained of in my previous article. "In some cases extreme reactions have resulted in phlebitis, periphlebitis, cellulitis and local gangrene, all with high temperature, severe pain and disability and immobilization of the patient, with added risk of deep vein thrombosis." These must be the conditions that Dr. Coppleson regards as unavoidable, and the conditions he does not regard as untoward results or complications. I disagree entirely and know from experience with dilute "Ethamolin" since 1940 that they are avoidable and should never occur. All surgeons who have used dilute "Ethamolin" will agree. A mild phlebitis is, it is true, unavoidable, but it should stop there. Dr. Coppleson further states: "Presumably he relies upon a case of pulmonary embolism reported by Dr. Coates . . ." This is an unwarranted presumption and a very thoughtless statement. Surely no one would form an opinion such as the one I have expressed on "Ethamolin" and state it in a scientific journal on the written record of a single case. I have held my views on "Ethamolin" for over ten years, used dilute "Ethamolin" at Sydney Hospital in 1940, have written several times about it (Lawes, 1949, 1951b), and, what is more, told Dr. Coppleson of my opinion when we were working together in an army hospital in 1940.

Dr. Coppleson is right when he states that pulmonary embolism can and does occur after any operation. But in all branches of surgery surgeons now take every possible precaution to prevent deep vein thrombosis and pulmonary embolism, even though these conditions are not common. There can therefore be no wisdom in regarding pulmonary embolism as a "bogy" and in continuing to use a solution three times stronger than is necessary.

In conclusion, I would state that as we have in one-third strength "Ethamolin" a satisfactory sclerosing agent for

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED NOVEMBER 24, 1951.¹

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory. ²	Australian Capital Territory.	Australia. ³
Acute Rheumatism	2	2
Amoebiasis
Ancylostomiasis
Anthrax
Bilharziasis
Brucellosis
Cholera
Chorea (St. Vitus)
Dengue
Diarrhoea (Infantile)	2(2)	..	..	2	..	..	4
Diphtheria	5(5)	3(3)	3	..	3(1)	..	..	..	17
Dysentery (Bacillary)	1(1)	..	..	..	..	..	1
Encephalitis
Filariasis
Homologous Serum Jaundice
Hydatid	1	..	..	..	1
Infective Hepatitis	16(14)	..	..	..	16
Lead Poisoning
Leprosy
Leptospirosis
Malaria
Meningococcal Infection	1	..	..	..	1	..	..	2
Ophthalmia
Ornithosis
Paratyphoid
Plague
Poliomyelitis	7(6)	2(1)	12(8)	50(23)	3(2)	1	..	..	75
Puerperal Fever
Rubella	14(5)	..	..	..	..	..	1	15
Salmonella Infection
Scarlet Fever	31(14)	15(8)	5(3)	4(3)	2(1)	4(2)	..	..	61
Smallpox
Tetanus
Trachoma
Trichinosis
Tuberculosis	47(36)	30(24)	10(4)	3(3)	11(9)	1(1)	..	4	106
Typhoid Fever
Typhus (Flea-, Mite- and Tick-borne)
Typhus (Louse-borne)
Yellow Fever

¹ Figures in parentheses are those for the metropolitan area.

² Figures not available.

³ Figures incomplete owing to absence of returns from the Northern Territory.

use with operation, there can, obviously, be no place for full strength "Ethamolin" as a retrograde injection.

149 Macquarie Street, Yours, etc.,
Sydney, C. H. WICKHAM LAWES.
November 22, 1951.

References.

- Lawes, C. H. Wickham (1949), "Treatment of Varicose Veins", *British Medical Journal*, Volume I, page 412.
— (1951a), "Some Points in the Management of Varicose Veins", *THE MEDICAL JOURNAL OF AUSTRALIA*, Volume I, page 637.
— (1951b), "Some Points in the Management of Varicose Veins", *ibidem*, Volume II, page 30.

A CRITICISM.

Sir: The following statement in your latest editorial calls, I feel, for a little criticism: "We have always held that the average practitioner who reads *THE MEDICAL JOURNAL OF AUSTRALIA* regularly and with care will not miss much that he should have." I, and others of my colleagues, feel that *THE MEDICAL JOURNAL OF AUSTRALIA* is of little use to the "average practitioner". In the first place, too many of the articles are too remote to be worth reading—stuff like "The Rh Types of Papuan Natives", and similar scientific matter unsuitable for a clinical journal. Secondly, there are too many reprints of dull presidential addresses. Thirdly, information urgently needed by the practitioner is not supplied. For instance, there has not been, as far as I am aware, any article to guide doctors on the rational use of the latest antibiotics—meanwhile on all sides one sees a haphazard and indiscriminate use of these important drugs. There is little in *THE MEDICAL JOURNAL OF AUSTRALIA* to help the doctor with his patients, and he is left to the dubious guidance of commercial brochures, unless he happens to subscribe to some useful journal such as *The Practitioner* (England), *The Lancet* (England), *G.P.* (America), or uses various "Latest Advances" publications.

The fault lies, I think, first in the indiscriminate publishing of every article submitted without critical review, and secondly, the journal tries too much to cover every field. Thus it is neither a journal of clinical medicine, a journal of scientific medicine, nor a journal of clinical research; it therefore satisfies very few. Lastly, it is published far too often, as the standard and suitability of material published is not such as to warrant a weekly publication.

79 North Road,
Oakleigh,
Victoria, S.E.12.
November 26, 1951.

Yours, etc., DAVID B. PITT.

[Dr. Pitt has taken a sentence out of its context and commented on it. We have never suggested that every practitioner should attempt to read every article published in *THE MEDICAL JOURNAL OF AUSTRALIA*.—EDITOR.]

Post-Graduate Work.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Annual Post-Graduate Oration, 1952.

THE Post-Graduate Committee in Medicine in the University of Sydney announces that the fifth annual post-graduate oration will be delivered in the Great Hall of the University of Sydney on the evening of Tuesday, May 6, 1952. The orator, Dr. C. G. McDonald, will speak on "The Life and Times of Dr. George Edward Rennie". Those wishing to have their names placed on the invitation list are requested to communicate before February 1, 1952, with the Secretary, the Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney. Telephones: BU 5238, BW 7483.

Medical Appointments.

Dr. T. Giblin has been appointed a member of the Medical Council of Tasmania.

Dr. R. Wall has been appointed medical officer of health to the St. Leonards Municipality, Tasmania.

Nominations and Elections.

THE undermentioned have been elected as members of the New South Wales Branch of the British Medical Association:

- Burke, Nora Teresa, M.B., B.S., 1947 (Univ. Sydney), "Greencourt", 1 Darley Street, King's Cross.
Caldwell, Maxine Margaret, M.B., B.S., 1950 (Univ. Sydney), Base Hospital, Orange.
Gluckstern, Geo Gideon, M.B., B.S., 1950 (Univ. Sydney), Flat 16, 12 Duttrac Street, Randwick.

Diary for the Month.

- JAN. 8.—New South Wales Branch, B.M.A.: Council Quarterly.
JAN. 9.—Western Australian Branch, B.M.A.: Council Meeting.
JAN. 10.—South Australian Branch, B.M.A.: Council Meeting.
JAN. 11.—Queensland Branch, B.M.A.: Council Meeting.
JAN. 15.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
JAN. 22.—New South Wales Branch, B.M.A.: Medical Politics Committee.
JAN. 25.—Queensland Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to *THE MEDICAL JOURNAL OF AUSTRALIA* alone, unless the contrary be stated.

All communications should be addressed to the Editor, *THE MEDICAL JOURNAL OF AUSTRALIA*, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

Members and subscribers are requested to notify the Manager, *THE MEDICAL JOURNAL OF AUSTRALIA*, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

SUBSCRIPTION RATES.—Medical students and others not receiving *THE MEDICAL JOURNAL OF AUSTRALIA* in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rate is £4 per annum within Australia and the British Commonwealth of Nations and £5 per annum within America and foreign countries, payable in advance.